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Official Register of



1989

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Harvard University



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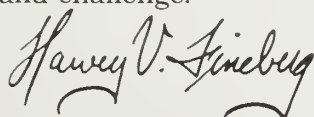
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■ A NOTE FROM THE DEAN

Public health is concerned with preserving and enhancing the health of populations. The scope of public health is extensive, as reflected in the range of courses, departments, centers, programs, and facilities described in this *Register*. The interests and expertise of faculty at the school are similarly diverse, extending across biological sciences, social sciences, numeric disciplines, and more.

This *Register* contains a wealth of information about educational opportunities at the School of Public Health. Though we have endeavored to make it accurate and comprehensive, it is necessarily an incomplete description of the learning experience available at the school. The School of Public Health is a place to acquire new skills; a place to enrich one's professional perspective by interacting with fellow students as well as with faculty; a place to gain a more sophisticated understanding of health sciences, health issues and problems and their possible solutions; a place to test one's ideals, objectives, and imagination against the imposing array of biological, individual, organizational, economic, and political barriers to improved public health.

The principal educational mission of the school is to prepare leaders in professional service and research aimed at promoting the health of populations. We believe we are engaged in a vital enterprise of central importance to society. We welcome those who join us at the school to share in that sense of excitement and challenge.



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Every effort is made to ensure the information contained in this *Register* is accurate at the time of publication. However, the School of Public Health reserves the right to make changes without notice in tuition and fees, admission and degree requirements, courses of instruction, and other information contained herein.

Harvard University's policy is to make decisions concerning applicants, students, faculty, and staff on the basis of the individual's qualifications to contribute to Harvard's educational objectives and institutional needs. The principle of not discriminating against individuals on the basis of race, color, sex, sexual orientation, religion, age, national or ethnic origin, political beliefs, veteran status, or disability unrelated to job or course of study requirements is consistent with the purposes of a university and with the law. Harvard expects that those with whom it deals will comply with all applicable antidiscrimination laws.

Chapter 151c, Section 2B, of the General Laws of Massachusetts Any student in an educational or vocational training institution, other than a religious or denominational educational or vocational training institution, who is unable, because of his religious beliefs, to attend classes or to participate in any examination, study, or work requirement on a particular day shall be excused from any such examination or study or work requirement, and shall be provided with an opportunity to make up such examination, study, or work requirement which he may have missed because of such absence on any particular day; provided, however, that such makeup examination or work shall not create an unreasonable burden upon such school. No fees of any kind shall be charged by the institution for making available to the said student such opportunity. No adverse or prejudicial effects shall result to any student because of his availing himself of the provisions of this section.

The Harvard School of Public Health is accredited by the Council on Education for Public Health.

ACADEMIC CALENDAR 1988-89

ORIENTATION — FALL 1988

September

- 6, Tuesday through September 9, Friday
13, Tuesday
14, Wednesday
15, Thursday and 16, Friday
- Orientation for new international students. Optional for United States MPH students.
Registration, in person, for all United States students, and opening session for all new students.
Department and program meetings.
Faculty advisers will be available to meet with students. Last day to register without late registration fee.

FALL TERM — 1988

September

- 19, Monday
- First period "a" and "ab" courses begin.

October

- 3, Monday
- Last day to register with late fee for fall.
Columbus Day, a holiday.

November

- 10, Thursday
11, Friday
14, Monday
24, Thursday through November 27, Sunday
- First period "a" courses end.
Veterans Day, a holiday.
Second period "b" courses begin.
Thanksgiving recess.

December

- 17, Saturday through January 2, Monday
- Recess.

January

- 16, Monday
18, Wednesday
20, Friday
23, Monday through January 27, Friday
- Martin Luther King, Jr.'s Birthday, a holiday.
Last day to pre-register for spring term.
Second period "ab" and "b" courses end.
Supervised special studies or field observations ("e" period).



Harvard School of Public Health Dean Harvey V. Fineberg, center, greets new students at fall orientation.

SPRING TERM — 1989

January

- 30, Monday
- Registration, in person, for new students. Third period "c" and "cd" courses begin.

February

- 10, Friday
20, Monday
- Last day to register with late fee for spring term.
Washington's Birthday, a holiday.

March

- 24, Friday
26, Sunday through April 2, Sunday
- Third period "c" courses end.
Spring recess.

- 27, Monday through March 31, Friday
- Supervised special studies or field observations ("f" period).

April

- 3, Monday
- Fourth period "d" courses begin.

May

- 26, Friday
29, Monday
30, Tuesday through June 2, Friday
- Fourth period "cd" and "d" courses end.
Memorial Day, a holiday.
Postclass period.

June

- 8, Thursday
- Commencement.

PHOTO CREDITS

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THE HARVARD SCHOOL OF PUBLIC HEALTH

■ THE PROFESSION

Public health is concerned with preserving and enhancing the health of populations. In the past, public health professionals—including physicians, managers, analysts, and scientists—have been instrumental in eradicating smallpox, developing a vaccine for polio, making progress toward the prevention of tropical diseases and the cure for sexually transmitted diseases, laying the foundation for the study of nutritional deficiencies and their corrections, establishing the field of industrial hygiene, applying statistical methods to the management of diseases, and using behavioral science in the reduction of self-imposed risks.

In the area of preserving and enhancing health, what is the distinction between medicine and public health? Unlike medicine, a well-established profession with a sharp public image, public health has multiple professional identities and a more diffuse image. This diverse group includes biostatisticians and epidemiologists, health administrators and educators, nutritional biochemists and cancer biologists, specialists in environmental and occupational health, and experts in behavioral and population sciences. In general, as a personal physician aims to maintain the health and to diagnose and treat diseases in an individual, the goal of the public health professional is to understand and meet the health needs of communities, groups, and nations. Where medicine follows a personal service ethic, conditioned by an awareness of social responsibilities, public health is governed by an ethic of public service, tempered by concern for the individual.

Some of the problems facing public health today include chemical and other hazards in the environment, the threat of new diseases such as AIDS, choices of lifestyle that rob millions of many healthy years, inappropriate use of medical technology, widespread inadequacy of health insurance and lack of access to the necessities of life, and the great parasitic diseases that kill and handicap millions around the globe. These represent challenges to which public health professionals continue to devote their energy and expertise.

■ THE SCHOOL

The Harvard School of Public Health seeks to educate scholars who will understand and help to ameliorate the health problems of society, to promote research that addresses these problems, and to train students to become leaders, advisers, and professional specialists sensitive to the needs of their communities.

The school's research aims to expand knowledge in health sciences by uncovering the fundamental mechanisms of disease and other causes of ill health in populations, and to improve the allocation of health resources by designing better health interventions, by improving the management of health institutions and systems, and by assisting in the development of health policy. In education, the school's overall goals are to prepare leadership in health, both national and international, for the twenty-first century, to serve the needs for continuing education in the health industry, and to increase public awareness and knowledge about health.

The school's research and teaching activities focus primarily on three areas of societal concern: health promotion and disease prevention, health policy and management, and international health, which combines and applies the first two areas in a broader setting. The programs in health promotion and disease preven-



Dr. Lincoln Chen, Takemi Professor of International Health, addresses the Takemi Symposium on health policy response to economic crisis derived from experiences in India and China.

tion seek to understand the factors that produce illness or impair health and to develop methods of preventing or reversing them. Health policy and management attempts to bring sound analytic and decision-making practices to bear upon the more than \$350 billion health care industry. Both areas emphasize the training of professional scientists and administrators for positions in research, academe, regulatory agencies, and health service institutions, and the advancement of basic scientific research and its application to pressing public health problems. The school serves as a crossroads for international health, attracting health policy makers and public health professionals from dozens of countries.

The faculty includes 180 professors (full and visiting) drawn from a variety of disciplines spanning the natural sciences, social and managerial sciences, and numeric sciences. The school offers programs leading to the Master and Doctor of Science, Master and Doctor of Public Health, and Master of Occupational Health. Degree programs are offered in the areas of behavioral sciences, biostatistics, cancer biology, environmental science and physiology, epidemiology, health policy and management, health services administration, maternal and child health, nutrition, occupational health, population sciences, toxicology, and tropical public health, in addition to the general Master of Public Health program. The school also offers mid-career education for practitioners in public health fields.

HISTORY OF THE SCHOOL

Professional education in public health had been steadily expanding at Harvard University for more than two decades before the actual founding of the School of Public Health in 1922. Its gradual development was characterized by certain important steps, the first of which was the establishment, in 1909, of the Department of Preventive Medicine and Hygiene in the Medical School—the first such department in the United States. The first Doctor of Public Health degree was conferred in 1911, the same year the Department of Sanitary Engineering was established in the Graduate School of Engineering. In 1913, the Department of Tropical Medicine was organized in the Medical School, followed in 1918 by the Division of Industrial Hygiene.

Also in 1913, the Harvard-MIT School for Health Officers was formed under the joint management of Harvard University and the Massachusetts Institute of Technology. The School for Health Officers operated until the fall of 1922, when it was superseded by the Harvard School

of Public Health, made possible by an endowment for this purpose from the Rockefeller Foundation.

During the early years of the school's operation, several of its departments functioned jointly with counterparts in the Medical School, sharing facilities, faculty, and budgets. In 1946, the school was separated administratively and financially from the Medical School and became an autonomous unit of Harvard University. It continues to cooperate with the Medical School in teaching and research, and has developed close associations with other divisions of the university, particularly the Graduate School of Arts and Sciences, the John F. Kennedy School of Government, and the Graduate School of Business Administration.

The school also maintains a close association with a wide variety of health, medical care, and welfare organizations in Massachusetts and elsewhere. The facilities of hospitals and other institutions located near the school are available to qualified students. Other local, national, and international health facilities provide opportunities for observation and special studies, and members of their staffs assist in the school's educational program. The State Laboratory Institute of the Massachusetts Department of Public Health allows qualified students to obtain experience in laboratory methods pertinent to public health.

RESOURCES

Location The school's main buildings for research, teaching, and administration are located in the heart of Boston's hospital district



Harvard School of Public Health buildings, center, with Harvard Medical School, at left, and the Countway Library of Medicine, at right.

and Harvard University's medical campus. The facilities adjoin those of Harvard Medical School, School of Dental Medicine, and Countway Library of Medicine, and are near Children's Hospital Medical Center, Beth Israel Hospital, Brigham and Women's Hospital, and other Harvard-affiliated hospitals.

The school is also within walking distance of Boston's Museum of Fine Arts and Isabella Stewart Gardner Museum, as well as Northeastern University and other colleges.

Public transportation to other parts of Boston is readily available. A shuttle bus, free to those affiliated with the university, runs frequently between the medical area, MIT, and Harvard's Cambridge campus.

Cross-Registration Students at the School of Public Health may enroll in courses offered by other Harvard schools, such as the Medical School, the Graduate School of Arts and Sciences, the John F. Kennedy School of Government, and the Graduate School of Business Administration. Many graduate courses at MIT and at the Fletcher School of Law and Diplomacy at Tufts University are also open to students at the school. Students are generally granted credit toward their degree for such courses, with the exception of courses in foreign languages.

Libraries The library needs of the school are served principally by the Francis A. Countway Library of Medicine. The Countway combines the resources and services of the Harvard Medical Library and the Boston Medical Library,



making it the largest medical or health-related library in the country. Its recorded holdings include more than 509,000 volumes and 4,800 periodicals. The Countway also owns an extensive collection of historical materials dating from

the fifteenth century. Its History of Medicine Department provides modern facilities for the use of these books and other rarities.

Students may borrow from the Harvard College Library in Cambridge and from the libraries of other Harvard schools. Messenger service is provided daily between the Harvard College Library, the Countway Library, and various other Harvard libraries. Some departments within the school also maintain libraries. The Boston Public Library, MIT libraries, and other libraries in the Boston area add to the total book and periodical resources available to students.

Health Sciences Computing Facility Computing and data processing resources are available to students through the Health Sciences Computing Facility (HSCF). HSCF programmers and analysts assist researchers and students in using computers to analyze data, to perform extensive numerical calculations, to format text, and to acquire, maintain, and process data bases.

HSCF offers computing for school courses and programs on a variety of equipment. An IBM mainframe, running OS/VS1, provides batch computing, PL/I and Fortran 77 as well as SAS, SPSS, SPSSX, BMDP, and Loglin statistical packages are available on the IBM. The facility also operates a Digital VAX minicomputer running ULTRIX, an interactive, time-sharing operating system. Programming languages and software include C, Pascal, Fortran 77, Loglin (loglinear analysis), RS/1 (statistical analysis), Minitab (statistical analysis), N/I/Troff (text formatting), ig2 (graphics), GDVS and IDES (data management), and BIBLIO (bibliographic data management).

Students may access the mini- and mainframe computers through terminals located on the fifth floor of the Kresge Building and on the twelfth floor of Building 1, as well as through personal computers. There is a fee for some HSCF services, and students should determine if they will be charged for computing before using the equipment.

HSCF maintains a tape library of data from the National Center for Health Statistics. Documentation and tapes are available for reference and copying.

HSCF offers a number of short courses, introductory and more advanced, in specific computer languages and packages. HSCF also provides consultation and advice for students for academically related data processing problems.

Microcomputer Laboratory Students and faculty may use the Microcomputer Laboratory's microcomputers and software for word processing, spreadsheets, file transfer, and basic statistical analysis. The laboratory is located in the school's main classroom building and is open from 8 AM to 10 PM seven days a week during the academic year. User assistants provide help with the hardware, and a library of documentation provides information about the available software.

The Microcomputer Laboratory has six PCs Limited 286 microcomputers, 24 IBM PC/XTs, one IBM PC/AT, five Macintosh SEs, two Diablo letter-quality printers, one HP LaserJet+, one Apple LaserWriter, and 23 dot-matrix printers.

Software support for the IBM-PCs and compatibles includes PC DOS 2.0, Lotus 1-2-3, WordPerfect 4.1, SAS, and Kermit 2.29 for file transfer and terminal emulation. Software for the MACs includes Microsoft Word 2.0, MacWrite, and MacDraw.

HEALTH PROMOTION TASK FORCE

The Health Promotion Task Force was established by the dean to identify ways that the Harvard School of Public Health could improve the health of its own population—students, faculty, and staff. The task force comprises six subcommittees which are looking into exercise, nutrition, the physical environment, smoking, alcohol and drug abuse, and stress.

School Smoking Policy As a part of the campaign for better health, the school has established a no-smoking policy. Smoking is currently permitted in very limited areas, and smokers are encouraged to attend smoking cessation classes.

■ THE STUDENTS

The student body includes about 470 full- and part-time students from throughout the United States and from some forty other countries. In terms of occupational background, approximately 26 percent are physicians; also present in significant numbers are health services administrators, epidemiologists, nurses, dentists, lawyers, statisticians, environmental scientists, research assistants, psychologists, and social workers. Nearly one-third of the students are enrolled in doctoral programs.



MINORITY STUDENTS

Members of minority groups at the school have joined to form the Committee for the Underrepresented. This group meets regularly throughout the academic year to plan special events such as the symposium "An Agenda for the Underserved: Contemporary Public Health Problems and Solutions and Their Impact on Minority Communities" held in 1987. Panel discussions led by academic experts and community leaders focused on school-based clinics, drug abuse and public policy issues regarding AIDS, environmental hazards in the urban community, and health of the immigrant population.

The Third World Caucus (TWC) implements programs and addresses issues that have an impact upon minority students at Harvard Medical School, School of Dental Medicine, and School of Public Health. It comprises four Harvard medical area student health organizations: Black Health Organization, Boricua Health Organization, National Chicano Health Organization, and Native American Health Organization.

Each fall, the school sponsors a reception to introduce minority students to minority alumni from the Boston area.

The school is eager to increase its enrollment of minority students and urges minorities to apply.

INTERNATIONAL STUDENTS

More than one-fifth of the students at the Harvard School of Public Health come from outside the United States. The experience they bring with them lends an important dimension to the international health components of the school's academic programs and adds to the diversity of the student population.



Students from abroad are invited to participate in the Host Family Program, administered by the Harvard International Office. This program provides students with the opportunity to get to know an American family who will welcome them and ease their transition to the American way of life.

The Harvard International Office also operates a furniture exchange during the summer and fall to provide low-cost secondhand furniture to students and scholars newly arriving from abroad. The furniture exchange is open on Tuesdays from 10 AM to 2 PM and from 5 PM to 7 PM, and on Thursdays from 10 AM to 2 PM.

For more information about either the Host Family Program or the furniture exchange, contact the Harvard International Office, 1350 Massachusetts Avenue, Cambridge, MA 02138 (telephone 617-495-3349).

HOUSING

The Henry Lee Shattuck International House is an apartment residence operated on a nonprofit basis by the school for its full-time students and their families from the United States and abroad. Located within walking distance of the school, Shattuck House consists of 72 apartments, each with a kitchenette and bath. All apartments are furnished with basic items except for linens, blankets, and kitchen utensils; no unfurnished units are available.

Since the demand far exceeds the number of apartments available, applications for Shattuck House should be submitted as soon as possible. **Prospective students may apply before they are accepted for admission to the school.** For application forms and more detailed informa-

tion, contact Carol O'Connell, Office of Student Affairs, Harvard School of Public Health, 677 Huntington Avenue, Boston, MA 02115 (telephone 617-732-1034).

The Office of Student Affairs also maintains a card file of available private housing and a list of local real estate agencies.

The Harvard University Housing Office in Cambridge administers housing in other university-owned complexes. Information and application forms may be obtained by writing to the Harvard University Housing Office, 7 Holyoke Street, Cambridge, MA 02138, or by calling 617-495-5239 (out of state: 1-800-252-5020). Students must enclose a copy of their letter of acceptance from the school with their housing application. The Housing Office also maintains listings of apartments and houses not owned by the university. These listings must be viewed in person; information is not given out by mail or telephone.

CHILD CARE FACILITIES

There are a number of child care facilities in the Harvard medical area and on the Cambridge campus. They are quickly filled, so arrangements should be made as early as possible. For further information, contact the Office of the Child Care Advisor at 617-732-1489 or 617-495-2851.

CAREER SERVICES

The Career Counselor in the Office for Students provides career counseling, maintains a resource center composed of job listings and files on health care organizations, contacts potential employers to acquaint them with programs at the school, and acquires information about job openings. She posts open positions (permanent, summer, and part time) and produces a semi-monthly *Job Opportunities Bulletin*, which is distributed to all students and to alumni upon request. She assists students in writing resumes, arranging for interviews, and exploring career opportunities, complementing the efforts of departments, programs, and faculty advisers. The Career Counselor also designs and conducts workshops and coordinates career panels. For more information about career services, please contact Andrea Price, Career Counselor, Harvard School of Public Health, 677 Huntington Avenue, Boston, MA 02115 (telephone 617-732-1036).

Graduates of the school's degree programs have become ministers of health, state and municipal commissioners of public health, congressional

health staff members, officials of federal regulatory agencies, managers of hospitals and health maintenance organizations, corporate health officers, and administrators of health services programs on the federal, state, and local level. Other graduates conduct basic and applied scientific research in academic, private, and government laboratories.

ALUMNI ASSOCIATION

The Alumni Association of the Harvard School of Public Health enjoys an active membership of 4,800 graduates worldwide. The association is governed by a council of twelve members, which meets each spring and again during the fall meeting of the American Public Health Association (APHA). Alumni also meet regionally in major cities in this country and abroad. These smaller gatherings are organized by members of the association and the council with assistance from the school. Reunions have been held in Boston, Chicago, Los Angeles, New York City, and Washington, DC, and in Sweden, Finland, and Japan.

In 1981, the Alumni Association was instrumental in establishing the Alumni Annual Fund for Student Assistance to help provide tuition scholarships, travel grants, and funding for other student needs.

Members of the Alumni Association have also formed a network for the purpose of providing information to potential applicants to the school. A list of contacts is included with the application materials.

Each spring, the school publishes the *Alumni Bulletin*, the official publication of the Alumni Association. The *Bulletin* reports on the diverse activities of alumni in many countries, and features articles and class news contributed by graduates.

For more information about alumni activities, contact the Alumni Office, Harvard School of Public Health, 677 Huntington Avenue, Boston, MA 02115.



The school's John C. Snyder Auditorium features state-of-the-art communications capacities to augment varied educational presentations.

DEGREE REQUIREMENTS

The Harvard School of Public Health offers programs leading to the graduate degrees of *Master of Science* in a specified field (SM in . . .), *Master of Public Health* (MPH), *Master of Occupational Health* (MOH), *Doctor of Science* (SD), and *Doctor of Public Health* (DrPH).

In general, the master's degrees are viewed as terminal degrees for individuals who seek professional positions in public health. In a few departments, however, the SM is intended as preparation for doctoral study. The doctoral programs are designed for students with interests in the scientific basis of public health and preventive medicine who wish to pursue academic or research careers. The following sections outline the general degree requirements of each program.

Background of Applicants For all programs, the school's Committee on Admissions and Degrees considers applicants' academic ability, the relevance of their previous education and experience, and their overall qualifications for graduate professional education in public health, including those qualities of character which reflect upon the individual's suitability to be a public health professional. Applicants must also satisfy the department or program to which they are applying that their background is appropriate for specialization in the particular field. Applicants to doctoral programs must demonstrate the ability to undertake original research. The following sections describe the usual background of applicants to each program.

Most courses at the school require students to write papers, reports, and examinations; doctoral students must also complete a thesis. All programs require course work in quantitative areas. Students who are not confident of their writing and/or math ability are advised to brush up on these skills, taking refresher courses, if necessary, before coming to the school.

For more information Because specific prerequisites and degree requirements vary with the discipline or field of specialization, prospective applicants should consult the sections of this book which describe departmental and interdisciplinary degree programs. Some programs require applicants to submit scores from the Graduate Record Examination (GRE) or from another standardized test; details about this requirement and other information about admissions procedures can be found in the section *Admission and Registration*. For any questions not answered in this *Official Register*, please write to Bernita L. Anderson, Director of Professional Development, at the Harvard School of Public Health, 677 Huntington Avenue, Boston, MA 02115, or telephone her at (617) 732-1036.

■ THE MASTER'S DEGREES

MASTER OF SCIENCE IN SPECIFIED FIELD

The Master of Science (SM) programs differ considerably from department to department, both in their overall goals and in their specific admission and degree requirements. An applicant may be admitted to an SM program in more than one discipline, if the program meets the requirements of both departments involved; in this case, the degree conferred specifies both fields. An applicant may be admitted to either a one-year or two-year program, as described below.

Background of Applicants Students in the SM programs come from a variety of backgrounds. Students in the one-year SM program generally hold doctoral degrees in medicine, dentistry, veterinary medicine, or in another field relevant to the department(s) to which admission is sought.



Applicants holding master's degrees may be considered for admission to one-year or two-year programs, depending upon their prior educational and professional background and upon the particular requirements of the program to which they wish to apply.

An applicant with a bachelor's degree is normally considered for admission to a two-year program. However, a few programs, such as those in Physical Sciences and Engineering (in the Department of Environmental Science and Physiology), consider certain applicants with bachelor's degrees for a one-year program. These applicants must have had adequate training in science and mathematics and normally at least two years of relevant professional experience in the field of specialization.

A year or more of appropriate graduate work occasionally enables a student to fulfill the requirements of certain two-year programs in one or one-and-a-half years.

Requirements for the Degree Students enrolled in a one-year program must successfully complete at least 40 credit units, and those in a two-year program, 80 credit units. Unless they can demonstrate equivalent preparation, candidates for the SM degree must fulfill basic requirements in biostatistics and epidemiology, as follows:

1. BIO 200ab, *Introduction to Statistical Methods* (5 units) or BIO 201ab, *Principles of Biostatistics* (5 units) or HPM-BIO 203b, 203c, 203d, *Statistical Methods for Health Policy and Management* (Module I, II, and III) (2.5 units each period)
2. EPI 200a, *Principles of Epidemiology* (2.5 units) or EPI 201a, *Introduction to Epidemiology* (2.5 units)

Applicants to programs in the biological sciences who lack a background in medicine or biology are advised to take ESP 205ab, *Human Physiology*, or a course in general biology elsewhere. Beyond these minimal course requirements, each department may specify additional courses that are necessary to satisfy degree requirements in the particular area of specialization.

MASTER OF PUBLIC HEALTH

The program leading to the Master of Public Health (MPH) degree is designed to prepare professionals for careers in public health practice. Through the core curriculum, the program provides a broad background in various disciplines basic to public health. Through the

choice of elective courses, students may acquire more breadth of knowledge or may pursue in some depth one or more areas of particular relevance to their career goals. The MPH degree program may also serve as a required academic year for residency training in preventive medicine, aerospace medicine, and occupational medicine. The occupational medicine residency is described with the Department of Environmental Science and Physiology.

Background of Applicants MPH students come from all around the world, bringing to the program a wide variety of backgrounds and experiences. Most applicants to the MPH program hold a doctoral degree in medicine, dentistry, or veterinary medicine. However, applicants with a doctoral degree in a related field, such as biology, behavioral sciences, other natural and social sciences, law, economics, and engineering, are also considered for admission. Consideration is given to applicants with a master's degree in a field closely related to public health, such as nursing or social work, who have a highly distinguished academic record and substantial relevant professional experience (usually at least three years in an administrative position of responsibility).

Requirements for the Degree MPH degree candidates normally complete the program in one academic year of full-time study at the school. A minimum of 40 credit units is required, but students are encouraged to take a total of 45 to 50 credit units. In some instances, with the approval of the Committee on Admissions and Degrees, a student may complete the program over a period of two academic years. In such a case, the student must take at least 15 units of the MPH core courses during the first year.

The Core Curriculum The core curriculum, required of *all* MPH degree candidates, is designed to provide a fundamental knowledge of the major areas of public health, including the environment, quantitative methods, and health administration and management. The core courses are as follows:

1. ESP 201a or 201c, *Principles of Environmental Health I* (2.5 units) **plus either** ESP 202b, *Principles of Environmental Health II* (2.5 units) or ESP 203d, *Principles of Environmental Health III* (2.5 units)
2. BIO 200ab, *Introduction to Statistical Methods* (5 units) or BIO 201ab, *Principles of Biostatistics* (5 units) or HPM-BIO 203b, 203c, 203d, *Statistical Methods for Health Policy and Management* (Module I, II, and III) (2.5 units each period)

3. EPI 200a, *Principles of Epidemiology* (2.5 units) or EPI 201a, *Introduction to Epidemiology* (2.5 units)
4. HPM 221ab, *Managing Health Delivery Organizations* (5 units), recommended for students interested in health care management in the United States or other affluent countries; or HPM 222ab, *Management in Public Health in Developing Countries* (5 units), recommended for students interested in international health; or HPM 220ab/220cd, *Administrative Systems* (10 units), required for students in the Health Services Administration management concentration (students must take both semesters)
5. A case studies course. The selection of case studies courses varies from year to year. In 1987-88, the options included courses in law and public health, health promotion, environmental and occupational epidemiology, policy implementation, and maternal and child health in developing countries.

MPH students concentrating in occupational health may make the following substitutions in the core requirements: TOX 204a, *Introduction to Principles of Toxicology* (2.5 units) or TOX 205ab, *Principles of Toxicology* (5 units), plus ESP 233b, *Industrial Toxicology* (2.5 units), may replace ESP 201a or 201c. ESP 231cd, *Occupational Health Policy and Administration* (5 units), satisfies the management requirement.

Ordinarily, the core courses represent less than half the total number of credit units recommended for the degree, allowing for flexibility in the program. Descriptions of each course appear in the section *Courses of Instruction*.

Departmental Concentrations The MPH is an interdisciplinary degree carrying no departmental designation. Students with specialized goals may choose to concentrate in one department by taking most of their elective courses in that department. Some departments require MPH students to take a specific set of courses over and above the MPH core curriculum, while others determine students' needs on an individual basis.

The General Program The General Program recognizes that some students seek a broader view of public health than that which a departmental affiliation offers. General Program students are free to choose their electives, under the guidance of the coordinators, from any available courses related to the field of public health. Some select courses in several departments, while others opt to take the majority of their electives in a single discipline.



Combined Degree Programs Students enrolled in an MD, DMD, DDS, or DVM program may apply for concurrent admission to the MPH program (or to an SM program, although this is less usual), provided that a combined program can be arranged that meets the approval of both the Committee on Admissions and Degrees and the institution from which the doctoral degree is being earned. Students usually apply in their second or third year of medical, dental, or veterinary school for enrollment in their third or fourth year. Requirements for the MPH degree are the same for students in the combined degree program as for all other MPH degree candidates. Students in this program receive the MPH upon successful completion of both degree programs and conferral of the doctoral degree.

Additional Degrees Some students choose to continue their studies at the school after completing the MPH degree. These students may apply for an SM or doctoral program in any of the departments which offer such programs.

Master of Public Health Program Office *Chief Coordinator:* Dr. Bernard Guyer; *Coordinators:* Dr. Eva Deykin and Dr. Ian Greaves. The coordinators have responsibility for the MPH degree program, oversee the core curriculum, and serve on the MPH Subcommittee of the Committee on Admissions and Degrees. They meet regularly with the MPH Program Committee, which is composed of representatives from the faculty of each department, from the student body, from the alumni/ae, and from the school administration. Faculty members on this committee serve as advisers to many of the students in the General Program. The MPH Program Office is the departmental office for students in the General Program and is the central source of information about the MPH degree program to all students and applicants.

MASTER OF OCCUPATIONAL HEALTH

The program leading to the degree Master of Occupational Health (MOH) is designed to train physicians in the public health disciplines relevant to preventing occupational disease and injury. This one-year degree program is usually taken as part of a two-year approved residency in occupational medicine. Additional information on the program can be found in the description of the Department of Environmental Science and Physiology.

Background of Applicants Candidates must be graduates of an approved school of medicine. Those from the United States should have completed an internship or residency of at least 12 months in a hospital approved by the American Medical Association.

Requirements for the Degree Candidates for the MOH degree spend one year in residence at the school and must complete a program of at least 40 credit units. All candidates take the courses listed below unless they can demonstrate equivalent preparation. The required courses comprise 32.5 credit units; additional courses may be selected from the curriculum approved for residencies in occupational medicine.

1. BIO 200ab, *Introduction to Statistical Methods* (5 units) or BIO 201ab, *Principles of Biostatistics* (5 units)
2. ESP 231cd, *Occupational Health Policy and Administration* (5 units)
3. ESP 232cd, *Introduction to Occupational Medicine* (2.5 units)
4. ESP 233b, *Industrial Toxicology* (2.5 units)
5. ESP 234cd, *Basic Problems in Occupational Health* (5 units)
6. ESP 251a, *Health Hazards of Manufacturing Processes* (2.5 units)
7. EPI 201a, *Introduction to Epidemiology* (2.5 units)
8. EPI-ESP 215cd, *Case Studies in Environmental and Occupational Epidemiology* (2.5 units)
9. TOX 204a, *Introduction to Principles of Toxicology* (2.5 units)
10. ESP 243ab, *Ergonomics/Human Factors* (2.5 units) or ESP 241cd, *Occupational Safety* (2.5 units)

Not required, but strongly recommended: BIO 210cd, *The Analysis of Rates and Proportions* (5 units) or BIO 211cd, *Regression and Analysis of Variance in Experimental Research* (5 units).

Descriptions of each course appear in the section *Courses of Instruction*.

■ THE DOCTORAL DEGREES

DOCTOR OF SCIENCE

The Doctor of Science (SD) degree is granted upon successful completion of a program of independent and original research in one of the basic disciplines of public health and the presentation of this research in an acceptable thesis.

Because specific prerequisites and degree requirements vary with the discipline or field of specialization, prospective applicants should consult the sections of this book which describe departmental and interdisciplinary degree programs. They are also encouraged to contact the department or program to which admission is sought for more detailed information.

An applicant may be admitted to a doctoral program in more than one discipline, if the program meets the requirements of both departments involved.

Background of Applicants Applicants to the SD program must hold at least a bachelor's degree. In some instances, an applicant will be expected to complete the SM degree at the school before being granted admission to doctoral study, in which case the student will first be admitted to an SM program.

Requirements for the Degree Students enrolled in the SD program complete a minimum of two academic years of full-time study in residence at the school. However, it generally



Harvard President Derek Bok greets Hanna Hastings, Director of Student Affairs, center, and Maud Matthews, Harvard South African Fellow, at an orientation week reception.

takes longer to complete the required work and to prepare an acceptable thesis. Residence requirements are fulfilled by payment of tuition (see *Expenses*) and by pursuit of an academic program approved by the department of concentration and by the Committee on Admissions and Degrees.

In addition to satisfying the residency requirements, doctoral students are required to complete a minimum of 40 credit units in graduate-level courses distributed over one major and two minor fields. Each minor field consists of at least 10 credit units in formal courses. Such requirements may be increased in cases where there has been a substantial shift in field or where the student has declared two major fields, or reduced in cases of prior relevant course work or experience. (However, the residency requirements described under *Expenses* must still be fulfilled.) Courses in the major and minor fields must be completed with grades of "A" or "B."

Unless equivalent preparation can be demonstrated, doctoral students must take one of the introductory epidemiology courses (EPI 200a or EPI 201a), as well as courses in biostatistics at an intermediate level (ordinarily BIO 210cd, *The Analysis of Rates and Proportions*; BIO 211cd, *Regression and Analysis of Variance in Experimental Research*; or ESP-BIO 207cd, *Statistical Methods in Biology*). Departments may stipulate specific course requirements and normally require written and/or oral examinations on the course work in the three fields.

Qualifying Examination By the end of the second year, students should be prepared to take the oral qualifying examination, which is intended to assess a student's potential to perform research in his or her chosen field. Since most doctoral research in the school requires a substantive knowledge of more than one discipline or field, the examining committee includes faculty from disciplines representing the minor fields as well as the major field. The examination includes questioning in these fields outside of the proposed research.

A research committee consisting of the student's adviser and other faculty members should be appointed within one month after the qualifying examination is passed. This committee guides the student's research through to completion, meeting with the student at least once every six months to discuss details of his or her progress.

Thesis An acceptable thesis must be submitted within five years of the date of registration as a doctoral candidate. Occasionally, upon approval of the student's research committee and of the Committee on Admission and Degrees, thesis work may be performed in non-resident status. The thesis consists of one or more manuscripts suitable for publication in a scientific medium appropriate to the candidate's field. A thesis is accepted only after a public presentation and discussion has been held, with the research committee in attendance.

The handbook *Guidelines for Doctoral Students* is distributed during fall registration. This guide outlines in greater detail the requirements and procedures of the doctoral programs.

DOCTOR OF PUBLIC HEALTH

Like the SD degree described above, the Doctor of Public Health (DrPH) is an advanced degree which is granted upon successful completion of an approved program of independent and original investigation in a special field of public health and the presentation of the results of this research in an acceptable thesis. Formal requirements for the DrPH are the same as those for the SD. The primary difference between the two programs lies in the background of the degree candidates.

Background of Applicants Most applicants for admission to the DrPH program hold a doctoral degree in medicine, dental medicine, or veterinary medicine. Depending on the intended field of specialization, consideration may also be given to a candidate who holds an advanced degree in one of the disciplines basic to public health. The applicant must also hold, or be in progress toward, the MPH degree, or its equivalent, from an approved institution.

DEPARTMENTS AND LABORATORIES

■ DEPARTMENT OF BEHAVIORAL SCIENCES

Steven L. Gortmaker, AB, SM, PhD, Associate Professor of Sociology and Acting Chairman of the Department

Faculty Professor Pierce; Associate Professor Cleary; Lecturers D. Walker and Wechsler

Adjunct Faculty Professor Mertens

The Department of Behavioral Sciences trains researchers, teachers, and professionals in the behavioral aspects of health and health services. Teaching and research focus on the areas of health promotion and education programs; influences of behavior on health and disease; behavioral pathologies, including mental illness and addiction to drugs and alcohol; behavioral aspects of health services, including psychosocial factors affecting the use of services and compliance with medical regimens, as well as the behavior of health professionals; and social science methodologies as applied to public health problems and the evaluation of health services and programs.

In addition to relevant elements of behavioral disciplines, students learn research skills and techniques of applying behavioral sciences to public health issues.

Activities of the Department Current areas of research include the following:

- Opiate addiction among street addicts, causes of relapse, and methods of improving drug user treatment programs; substance abuse in health professionals; alcohol and drug use among junior high school, high school, and college students, and programs to reduce such use
- Success of perinatal health programs in reducing infant mortality and morbidity in both rural and urban areas of the United States
- Long-term impact of secondary prevention programs for adolescent pregnant women and school-aged parents (conducted in seven community sites across the country)
- Relationships among social supports, the availability and use of community services, family organizations, and the management and functioning of children with chronic illness
- Evaluation of the success of worksite health promotion programs
- Evaluation of interventions to reduce risks of HIV infection

- Environmental, social, and behavioral influences on childhood and adolescent obesity, focusing on the impact of television viewing, exercise, and recent trends in the United States
- Reduction of mortality from coronary heart disease by altering the risk factors of elevated blood pressure, elevated blood cholesterol, and cigarette smoking (Multiple Risk Factor Intervention Trial [MRFIT])
- Role of stress and social support systems in the use of primary care health services

Degree Programs

Master of Science in Behavioral Sciences
Master of Public Health with
concentration in Behavioral Sciences
Doctor of Science
Doctor of Public Health

Master's candidates do course work in areas of health and behavior, health promotion and education, behavioral aspects of health services, and behavioral pathologies. Doctoral candidates develop expertise in three major areas of behavioral sciences, in research and evaluation methods, in statistical methods, and in an area of specialization such as the self-help approach to alcohol and drug treatment, smoking prevention, or models of contraceptive behavior.

Background of Applicants Applicants with a bachelor's degree in a related behavioral sciences discipline are generally admitted to the two-year master's program. Applicants with a master's or a doctoral degree may complete the Master of Science degree in one year or can be admitted directly into the doctoral program.

Career Outlook Some positions taken by recent doctoral graduates include director of research and evaluation, Ounce of Prevention; senior analyst and administrative director in health communication; senior project director, Education Development Center; assistant professor, University of Michigan; lecturer on social medicine and health policy, Harvard Medical School; health promotion activities evaluator, Kaiser-Permanente Medical Group; and superintendent of social services, SARDA, Hong Kong.

For more information Please refer to the section *Degree Requirements* for general informa-

tion about the degree programs. Additional information about admissions requirements and procedures can be found in the section *Admission and Registration*.

■ DEPARTMENT OF BIOSTATISTICS

Marvin Zelen, SB, AM, PhD, AM (hon.), Professor of Statistical Science and Chairman of the Department

Faculty Professors Lagakos, Laird, Pagano, Ware, and Weinstein; Visiting Professors Agresti and Patel; Associate Professors Anderson, Begg, H. Feldman, Feldstein, Gelber, Gelman, D. Harrington, Larson, Mehta, Politser, Robins, Schoenfeld, and Tsiatis; Assistant Professors DeGruttola, Finkelstein, Gray, Kalish, Kim, Lefkopoulou, Orav, and L. Ryan; Lecturer Testa; Members of the Faculty Greenes and Waternaux

The programs in the Department of Biostatistics prepare students to contribute to the theory and practice of statistical science as applied to health. The department's programs in methodological research and interdisciplinary collaborations provide many opportunities for student participation. The school has computing facilities which support all the commonly used statistical packages.

The department sponsors a number of semi-monthly working seminars to foster student and faculty interest in new research areas. The working seminar topics for the 1987-88 academic year were AIDS modeling, bioassay, decision sciences, errors in variables, longitudinal analysis, meta analysis, and teratology.

The faculty includes leaders in the development of statistical methods for clinical trials and observational studies, studies on the environment, animal experiments, and longitudinal studies. Members of the department serve on a large number of national and international advisory committees.

An introductory course in biostatistics is required of all students at the school; many students take further courses in the department. The department offers courses at the elementary, intermediate, and advanced levels. Elementary courses assume little background in mathematics and are designed for a wide audience. They aim to develop facility in quantitative reasoning, a command of basic methodology, and a critical appreciation of good statistical practice in the health sciences. Intermediate courses are designed to develop methodological skills in specific areas of application, such as epidemiology, health policy, and experimental science. Advanced courses require a strong background in mathematics and are

primarily intended for degree candidates in biostatistics.

Activities of the Department Current areas of research include the following:

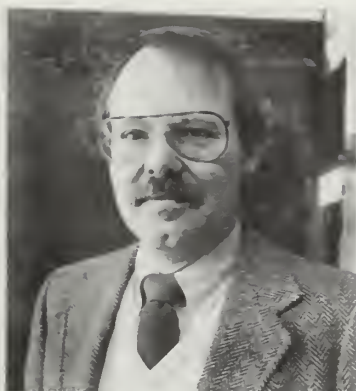
- Health effects of indoor and outdoor air pollution, carcinogenicity testing, community studies and environmental monitoring, carcinogenic and teratogenic effects of chemicals, meta analysis, and statistical aspects of the study of AIDS
- Research and development of statistical and computing methods for clinical trials, including sequential methods and survival models; environmental and epidemiologic research, including methods for longitudinal studies; analyses with incomplete data; and multi-parameter estimation problems
- Statistical computing methods with emphasis on numerical algorithms, simulation techniques, epidemic and mathematical modeling, DNA modeling and manipulation, computer graphics, software engineering and expert systems, use of microcomputers in clinical trials
- Collaborative clinical research in the treatment of cancer in more than 150 national and international clinical trials
- Quantitative problems in health risk analysis, technology assessment, and clinical decision making, including new methods for assessing risks and benefits associated with environmental regulations; costs, risks, and benefits of clinical practices and medical technologies; and the impact of organizational structure on decision making
- International health projects based on the department's designation by the World Health Organization (WHO) as a Biostatistics Evaluation Center for Cancer
- Biomedical research consulting conducted through the Biostatistics Consulting Laboratory
- Collaborative research activities with biomedical scientists at the Harvard Medical School and affiliated hospitals

Degree Programs

Master of Science in Biostatistics
Master of Public Health with concentration in Biostatistics
Doctor of Science
Doctor of Public Health

Areas of Concentration

Biostatistics
Health Decision Sciences



Dr. James H. Ware, Professor of Biostatistics, is interested in the design and analysis of longitudinal studies and clinical trials.

CONCENTRATION IN BIOSTATISTICS

The main program in the department is biostatistics. Both the master's and the doctoral programs provide rigorous training and practical experience in statistical methods as they relate to the biomedical sciences. The primary emphasis of the department is doctoral training; course offerings reflect this orientation. The department offers a master's program mainly to prepare students for doctoral study, but qualified students can pursue the master's degree only.

Required course work includes probability, statistical inference, statistical methodology, epidemiology, and computing; electives include advanced courses in biostatistics as well as courses in the biomedical sciences and health policy and management. Students are given experience in computing and have the opportunity to teach in the department's school-wide courses. They also develop consultative and data analytic skills through participation in the activities of the Biostatistics Consulting Laboratory.

At the end of their third semester, doctoral candidates are required to take a written qualifying examination and within the year make an oral presentation of research plans. Students who enter the doctoral program with a master's degree in biostatistics or statistics are encouraged to take the written qualifying examination in their first year of study. The doctoral thesis may include either original contributions to statistical methodology related to the health sciences or an innovative application to a field of public health or medicine.

CONCENTRATION IN HEALTH DECISION SCIENCES

This program offers training in quantitative techniques in decision making at individual (clinical) and collective (policy) levels. In addition

to core courses in probability and biostatistics, students take courses in decision analysis, cost-benefit and cost-effectiveness analysis, operations research, applied economics, behavioral decision theory, and computing. While methods are taught rigorously, applications to medicine, health care policy, and environmental risk analysis are also emphasized. This is a joint program with the Department of Health Policy and Management; students may enroll in either department.

Background of Applicants Applicants to both programs should have strong preparation in mathematics and an interest in the health sciences. It is recommended that the mathematical preparation include at least one year of analysis past elementary calculus and linear algebra. Some knowledge of computing is helpful, but not essential, as the department provides opportunities for students to become familiar with modern computing through formal courses and consulting.

Students may enter the doctoral program directly or as a sequel to the master's program. Students entering the doctoral program as a sequel to the master's program are expected to take the written qualifying examination in the first year of the doctoral program. The path to the doctoral program depends on the student's level of preparation at the time of application. Students desiring a doctorate are encouraged to apply directly to the doctoral program. Doctoral applicants with insufficient preparation will be considered for the master's program.

Career Outlook The career outlook for biostatisticians is excellent. There are many more open positions than available candidates. The shortage of biostatisticians is expected to continue through this decade. Positions taken by recent graduates include faculty posts at universities and schools of public health, and positions in research laboratories and centers in the federal government, in pharmaceutical companies, and in research institutes.

For more information Please refer to the section *Degree Requirements* for general information about the degree programs. Additional information about admissions requirements and procedures can be found in the section *Admission and Registration*. Further information about the programs can be obtained by writing to the department chairman.

■ DEPARTMENT OF CANCER BIOLOGY

M. E. Essex, SB, DVM, SM, PhD, AM (hon.), Professor of Microbiology and Chairman of the Department

Faculty Professors Cairns and Little; Associate Professors Glimcher, Haseltine, Kennedy, and Mullins; Assistant Professors Lee and Liber

The Department of Cancer Biology is primarily involved in research into the causes of cancer and offers training programs in basic and applied research leading to the Doctor of Science degree. Research activities are centered in the department's Laboratories of Carcinogenesis; Radiobiology; and Virology, Immunology, and Molecular Genetics.

Activities of the Department Current areas of research include the following:

- Precise changes in DNA sequences produced by the main categories of chemical carcinogens
- Mechanisms of mutagenesis and DNA repair
- Induction, mutation, and malignant transformation in mammalian cells by low and high LET radiations and by chemical agents
- Radiation-induced DNA damage and repair processes at the cellular and molecular levels
- Cytogenetic effects of radiation and chemical pollutants
- Effects of radiation in human diploid cells from cancer-prone patients
- Role of viruses in the cause of cancer, including hepatitis B virus and human liver cancer, and RNA tumor viruses as causes of leukemias, lymphomas, other tumors, and immunosuppressive disorders of animals and man; pathogenesis of AIDS and characterization of the family of retroviruses associated with this disease
- Tumor immunology, the molecular biology of cancer, gene regulation, and genetic events associated with the induction of leukemia and immunosuppressive disease

Degree Program

Doctor of Science

Areas of Concentration

Carcinogenesis

Radiobiology

Virology, Immunology, and Molecular Genetics

The program aims to develop the basic skills in laboratory techniques and data handling necessary for undertaking original research. For all areas of concentration, course work during the



Dr. Myron Essex, Professor of Microbiology and an internationally recognized leader in AIDS research, chairs Harvard University's new AIDS Institute.

first one to two years emphasizes cancer biology, cellular and molecular biology, virology, immunology, radiation biology, and genetics. Additional courses are available in several areas of microbiology, in biochemistry, and in cell biology at the Harvard Medical School, at other Harvard schools, and at MIT. Students are encouraged to participate in the numerous seminar series and informal discussion groups offered in the Harvard Medical Area.

The program emphasizes publication of research results in the standard research literature. Most doctoral students in the department publish several papers before completing the degree. The latter part of the program involves intensive laboratory research under the guidance of a faculty adviser in the area of concentration.

Background of Applicants Consideration is given to applicants with a bachelor's degree in biochemistry, biology, or chemistry, as well as those with a clinical degree in medicine, dentistry, or veterinary medicine. Applicants should specify an area of interest. Personal interviews are encouraged.

Career Outlook Typical positions taken by recent graduates include postdoctoral research fellowships, junior faculty positions at academic institutions, and positions in independent research institutes, in governmental agencies, and in the biotechnical industry.

For more information Please refer to the section *Degree Requirements* for general information about the degree programs. Additional information about admissions requirements and procedures can be found in the section *Admission and Registration*.

To find out more about the department's activities and programs, contact Jacqueline Kelley in the Department of Cancer Biology.

■ DEPARTMENT OF ENVIRONMENTAL SCIENCE AND PHYSIOLOGY

Donald F. Hornig, SB, PhD, Professor of Chemistry in Public Health, Director of Interdisciplinary Programs in Health, and Chairman of the Department

Faculty Professors Brain, Ferris, J. Harrington, Moeller, Monson, Speizer, and Spengler; Associate Professors Banzett, Burgess, Butler, Dennis, Drazen, Evans, H. Feldman, Greaves, Loring, Robins, and Valberg; Assistant Professors Christiani, Dockery, Eisen, Kelsey, Kobzik, Koutrakis, Kriebel, Reid, P.B. Ryan, and Yanagisawa; Lecturers Korn, Shapiro, and Snook; Member of the Faculty Ingram

Adjunct Faculty Associate Professor Amdur; Lecturer Cudworth

The Department of Environmental Science and Physiology is concerned with the detection and prevention of adverse health effects caused by chemical and physical factors in occupational and community settings. The problems are complex and require the insights of many specialties. The department's faculty, research staff, and students reflect the multidisciplinary nature of the field and include applied mathematicians, chemists, economists, engineers, epidemiologists, physicians, experimental psychologists, occupational health nurses, physiologists, and physicists.

Several of the programs offer financial support to qualified individuals on a competitive basis.

Activities of the Department Current areas of research include the following:

- Inhalation toxicology, comparative respiratory physiology, and deposition and clearance of particles in the respiratory tract
- Acute and chronic epidemiologic studies of working and community populations exposed to various toxic materials
- Mechanical properties of lungs and chest wall, development of pulmonary function tests and testing equipment, and application of these methods to the study of respiratory disease in occupational and community environments
- Design and evaluation of local exhaust systems and respiratory protection devices for the protection of workers
- Personal exposure assessment of gases and particles, evaluation of chemical composition of particles, nicotine and cotinine exposures, and modeling exposures
- Instrumental methods for collection of particles and pollutant gases in industrial and environmental conditions; measurement of acid gases and particles
- Transport, transformation, and removal of environmental contaminants

- Statistical and methodological issues in the analysis of data from occupational health studies
- Analysis of approaches for efficiently collecting exposure information in support of environmental control decisions
- Risk assessment and evaluation for hazardous waste sites and energy sources
- Failures of air cleaning systems in nuclear power plants
- Control of naturally occurring radon and radon daughter products in homes
- Protecting the public in case of a nuclear accident
- International occupational health and safety

Degree Programs

Master of Science in Environmental Health Sciences
 Master of Science in Physiology
 Master of Public Health with concentration in Environmental Health Sciences or Occupational Health
 Master of Occupational Health
 Doctor of Science
 Doctor of Public Health

Areas of Concentration

Occupational Health
 Industrial Hygiene and Occupational Safety
 Occupational Health Nursing
 Occupational Medicine
 Occupational Safety and Health
 Physical Sciences and Engineering
 Air Pollution
 Environmental Health Management
 Industrial Hygiene and Occupational Safety
 Radiological Health (Radiation Protection)
 Respiratory Biology
 Respiratory Epidemiology

OCCUPATIONAL HEALTH

Richard R. Monson, SB, MD, SM in Hyg., SD in Hyg., Professor of Epidemiology and Director of the Educational Resource Center for Occupational Safety and Health

The training programs in occupational safety and health listed below are offered through the NIOSH-sponsored Educational Resource Center for Occupational Safety and Health at Harvard (see *Centers and Offices*).

Industrial Hygiene and Occupational Safety

The two-year Master of Science (SM) program in industrial hygiene and occupational safety is an integral component of the Educational Resource Center for Occupational Safety and Health. Admissions and curriculum are administered through the department's Physical Sciences and Engineering program unit, described further along in this section of the *Register*.

Occupational Health Nursing

A two-year educational program for the preparation of graduate nursing students at the master's level in occupational health and occupational health nursing is offered by the Educational Resource Center. The curriculum prepares students in the practice of occupational health nursing and in the basics of occupational health research, reflecting and promoting diversified and expanded roles in this specialty practice. Upon completion of degree requirements, a Master of Science in Physiology (Occupational Health) degree is awarded.

The program places major emphasis on identification of health hazards, workplace assessment, program planning and intervention, worker health promotion, and disease and injury prevention. The training includes courses in occupational health, industrial hygiene, epidemiology, biostatistics, toxicology, occupational health nursing, health behavior, administration, and policy. Industrial settings, clinics, hospital-based occupational health programs, and agencies serve as practicum placement sites. Research activities include pilot epidemiologic studies, collaborative projects, and surveillance activities culminating in a research paper.

Some financial support may be available for United States citizens or permanent residents through traineeships or scholarships. For more information, contact Mr. Daryl Bichel, Occupational Health Program, Harvard School of Public Health, 665 Huntington Avenue, Boston, MA 02115 (telephone 617-732-1260).

Background of Applicants Applicants must have at least a bachelor's degree in nursing from a program accredited by the National League for Nursing and three years of nursing experience, preferably in occupational health nursing. Documents required for application include a goal statement, college transcripts, letters of recommendation from three persons, aptitude scores from the Graduate Record Examination (GRE),

evidence of satisfactory completion of a basic statistics course, and registration to practice nursing in a state or territory.

Occupational Medicine

The one-year program in occupational medicine leads to either the Master of Occupational Health (MOH) or the Master of Public Health (MPH) degree. Physicians are trained in the public health disciplines relevant to the prevention and control of occupational disease and injury. The course work includes epidemiology, biostatistics, occupational medicine, toxicology, industrial hygiene, health policy, and administration.

The Harvard School of Public Health–University of Massachusetts Occupational Medicine Residency is fully accredited by the Accreditation Council for Graduate Medical Education to offer the didactic training outlined above and a practicum year leading to board eligibility in occupational medicine. Dr. David C. Christiani from Harvard is director of the residency; Dr. Ian A. Greaves from Harvard and Dr. Jay S. Himmelstein from the University of Massachusetts are co-directors.

Two practicum year tracks are available. The practicum year at the Harvard School of Public Health emphasizes the development of skills in clinical occupational medicine and occupational epidemiology. During this year, acquired knowledge and abilities are applied to patient management and workplace problem solving, and at least one short-term research project is designed, executed, and documented under faculty supervision. Field experience includes rotations through hospital-based occupational health clinics, the Massachusetts Division of Occupational Hygiene, and corporate medical departments. For more information, contact Mr. Daryl Bichel, Occupational Health Program, Harvard School of Public Health, 665 Huntington Avenue, Boston, MA 02115 (telephone 617-732-1260).

The practicum year at the University of Massachusetts Medical Center emphasizes clinical occupational medicine, although research opportunities also exist. Clinical electives in relevant medical and surgical subspecialties are available, and skill development in consultation and workplace interventions is stressed. For further information, contact Dr. Jay Himmelstein, Occupational Health Program, Department of Family and Community Medicine, University of Massachusetts Medical Center, 55 Lake Avenue North, Worcester, MA 01685 (telephone 508-856-2734).

Some financial support for residency candidates who are United States citizens or permanent residents may be available through traineeships or National Research Service Awards.

Background of Applicants Physicians currently holding positions in the field of occupational safety and health who plan to return to these positions are considered particularly strong candidates for admission.

The two-year residency is open to candidates who have completed at least one year of clinical training in internal medicine or family practice; in addition, board eligibility or certification in a primary care specialty is preferred.

In addition to an application to the degree program, applicants should send a letter of interest to the Occupational Health Program at Harvard University, indicating their preferred site for the practicum year and enclosing a curriculum vitae listing medical training and experience, research experience, and publications. Admission to the practicum year of the residency is a separate process from admission to the degree program, but usually occurs shortly after admission to the degree program. Regardless of initial acceptance, continuation into the second year of the residency is contingent upon having had adequate prior clinical experience and exemplary performance in the didactic phase of the program. Applications for the degree program are reviewed and approved beginning in September for admission in September of the following year. Applicants who require early notification should indicate this in a cover letter accompanying the application forms.

Occupational Safety and Health

The Master of Science (SM) program in occupational safety and health emphasizes the epidemiologic and biostatistical aspects of occupational safety and health. This is generally a two-year degree program, although an individual with a PhD or JD degree may complete the program in one year. It is anticipated that persons without a doctoral degree will subsequently enroll in a doctoral program.

Some financial support may be available for United States citizens or permanent residents through traineeships or National Research Service Awards. For further information, contact Dr. James M. Robins, Department of Environmental Science and Physiology, Harvard School of Public Health, 665 Huntington Avenue, Boston, MA 02115 (telephone 617-732-1260).

Background of Applicants Applicants normally have a bachelor's degree and advanced training in science. Applicants currently holding positions in the field of occupational safety and health who plan to return to these positions are considered particularly strong candidates for admission. College-level organic and inorganic chemistry are required for admission.

PHYSICAL SCIENCES AND ENGINEERING

John D. Spengler, SB, PhD, SM in Env.H., Professor of Environmental Health and Director of the Program in Physical Sciences and Engineering

This program unit emphasizes the chemical, physical, and engineering aspects of public and occupational exposures and of contaminant control technology. Master's and doctoral degree programs are offered in four areas of concentration: Air Pollution, Environmental Health Management, Industrial Hygiene and Occupational Safety, and Radiological Health (Radiation Protection).

Background of Applicants Physical Sciences and Engineering candidates normally have a bachelor's degree in engineering, chemistry, physics, mathematics, or biology. Preparation in the sciences ordinarily includes courses in differential and integral calculus, general and organic chemistry, and physics (mechanics).

The Master of Science (SM) degree is normally earned after two years. Applicants with advanced degrees or two years of relevant experience may request consideration for admission to a one-year SM program. Beginning with academic year 1988-89, bachelor's degree holders with an extremely strong background in the sciences, with undergraduate preparation in subjects such as statistics, mammalian physiology, and microeconomics, may also be considered for admission to a one-year program. Applicants interested in this option may consult Dr. Joseph J. Harrington for further information (telephone 617-732-1163).

Doctoral degree applicants should contact Linda Fox in the Physical Sciences and Engineering Program Office (telephone 617-732-1170) to arrange for an interview with faculty in the program.

Air Pollution

The Master of Science (SM) and doctoral programs provide education in atmospheric chemistry, air monitoring, turbulence and diffusion,



Dr. Yukio Yanagisawa, Assistant Professor of Environmental Health, leads a class in Analytical Chemistry and Exposure Assessment.

acrosol sciences, control technology, indoor air pollution, exposure assessment, and health effects of air pollutants. The curriculum also includes courses in toxicology, statistics, environmental law, and physiology. For more information, contact Dr. P. Barry Ryan, Department of Environmental Science and Physiology, Harvard School of Public Health, 665 Huntington Avenue, Boston, MA 02115 (telephone 617-732-1167).

Environmental Health Management

The master's and doctoral programs in environmental health management are intended for students interested in quantitative approaches to the evaluation and management of the physical environment. Students complete courses in three areas: basic environmental sciences, data analysis and inference, and decision sciences.

Basic environmental science courses include exposure assessment, environmental chemistry, physiology, and environmental/industrial toxicology. Advanced courses in environmental science may have a wide scope or may be oriented toward a specific medium (such as air, surface water, or groundwater) or pollutant (such as ionizing radiation); they may focus on monitoring, modeling, or control of pollutants. Courses in data analysis and inference include basic biostatistics and epidemiology and more advanced topics such as multiple regression and

analysis of variance. The required courses in decision sciences familiarize students with concepts and techniques from operations management, statistical decision analysis, and economics.

Courses in the three basic areas are supplemented by electives, such as environmental law, environmental and natural resource policy, environmental or regulatory economics, computer science, cancer biology, and health risk assessment. Some of these electives are offered at other Harvard schools or at MIT. Students particularly interested in hazardous waste management or groundwater contamination normally take about one-third of their courses outside the Harvard School of Public Health. Students are encouraged to participate in summer internships, although this is not a requirement. For more information, contact Dr. John S. Evans, Department of Environmental Science and Physiology, Harvard School of Public Health, 665 Huntington Avenue, Boston, MA 02115 (telephone 617-732-1258).

Industrial Hygiene and Occupational Safety

The Master of Science (SM) and doctoral programs in industrial hygiene and occupational safety are designed to help meet the demand for professional personnel with the skills and scientific knowledge needed to identify and control health problems of the workplace. The core curriculum includes courses in exposure assessment, environmental chemistry, manufacturing processes, environmental control, safety and ergonomics, radiological health, toxicology, and epidemiology. Additional courses in risk assessment, policy and administration, and occupational/environmental law are available.

Students specializing in industrial hygiene normally undertake internships and research projects dealing with toxic substances, noise, radiation, and heat stress. Students graduating from the program have the skills required to handle the broad range of environmental hazards existing in the workplace. For more information, contact Dr. John S. Evans, Department of Environmental Science and Physiology, Harvard School of Public Health, 665 Huntington Avenue, Boston, MA 02115 (telephone 617-732-1258).

Radiological Health (Radiation Protection)

The Master of Science (SM) and doctoral programs in this area are intended for individuals pursuing careers in radiation health physics.

The fundamentals of radiation detection, consequences of environmental release, protection, and control are emphasized. The curriculum includes courses in radiation protection, radiation biology, instrumentation, dosimetry, and aerosol sciences. For more information, contact Dr. Dade W. Moeller, Office of Continuing Education, Harvard School of Public Health, 677 Huntington Avenue, Boston, MA 02115 (telephone 617-732-0793).

RESPIRATORY BIOLOGY

Joseph D. Brain, AB, SM, SM in Hyg., SD in Hyg., Cecil K. and Philip Drinker Professor of Environmental Physiology, Professor of Physiology, and Director of the Program in Respiratory Biology

This program offers doctoral training in preparation for research careers in respiratory biology. It is built on a public health viewpoint of the lung as a portal of entry and a target organ for environmental agents, and focuses on two aspects of organ system physiology: respiratory mechanics and respiratory defense mechanisms. The program also emphasizes inhalation toxicology and the pathology of environmental and occupational lung disease. The biology is broadly based, ranging from molecular and cell biology to integrated organismic, environmental, and comparative physiology; both normal and pathological physiology are included.

Intensive course work in the first two years may include physiology, biochemistry, histology, engineering, toxicology, radiation biology, statistics, epidemiology, pathology, and immunology. The latter part of the program consists of research under the guidance of a faculty adviser. Collaborative research opportunities exist in several area institutions.

Background of Applicants Candidates normally have a bachelor's degree in the physical sciences, or in biology with a strong physical science and mathematical component. The Master of Science (SM) degree is normally earned after two years, although students with prior master's degrees in related areas may earn the SM in one year. Terminal master's degree programs are not ordinarily offered; students are expected to continue for the doctoral degree.

RESPIRATORY EPIDEMIOLOGY

Benjamin G. Ferris, Jr., AB, MD, DHC (hon.), Professor of Environmental Health and Safety and Director of the Program in Respiratory Epidemiology

This program offers training at both the master's and doctoral level in preparation for research careers in respiratory epidemiology.

Major work at present is directed toward assessing the possible effects of sulfur oxides, nitrogen dioxide, ozone, particulate matter, acid aerosols, and other pollutants on health. This has involved both adults and children, and airborne material both indoors and outdoors. The research has been planned as a longitudinal study (about to enter its fifteenth year), so that a considerable data base has been developed for both aerometrics and health data. Health effects are being assessed by standard questionnaires and simple tests of pulmonary function.

Background of Applicants Candidates are generally doctoral students or postdoctoral trainees with qualifications in medicine or biostatistics.

Career Outlook Some positions taken by recent graduates of the various programs offered by the Department of Environmental Science and Physiology include industrial hygienist with the US Department of Labor, the state of Rhode Island, and the Aluminum Company of America; assistant director, NIOSH; epidemiologist, United Auto Workers Union; coordinator of environmental quality, state of Oregon; environmental engineer and scientist in government and industry; and assistant professor in schools of medicine, public health, and nursing.

For more information Please refer to the section *Degree Requirements* for general information about the degree programs. Additional information about admissions requirements and procedures can be found in the section *Admission and Registration*.

■ DEPARTMENT OF EPIDEMIOLOGY

Brian MacMahon, MB, ChB, MD, DPH, PhD, SM in Hyg., MD (hon.), DSc (hon.), Henry Pickering Walcott Professor of Epidemiology and Chairman of the Department

Faculty Professors Monson, Tsuang, and Willett; Associate Professors Mueller, Stampfer, and A. Walker; Assistant Professors Cattani, Hsieh, Kriebel, Krolewski, and Maclure; Lecturers Cook and Murphy

Adjunct Faculty Professors Paffenbarger and Trichopoulos

Epidemiology is the study of the frequency and distribution of disease and of its determinants. The Department of Epidemiology offers training in the application of epidemiologic methods to the investigation of diseases of unknown cause. Areas of emphasis include malignant neoplasms, cardiovascular disorders, abnormalities of reproduction and development, mental disorders, and other major diseases for which preventive measures are still unknown or inadequate.

Activities of the Department Current areas of research include the following:

- Role of viruses in the etiology of cancer
- Relationship between thyroid disease treatment and breast cancer
- Relationship between exposure to chemicals in the workplace and the development of cancer
- Health effects of oral contraceptives
- Relationship of hormonal patterns and breast cancer
- Etiology of non-Hodgkin's lymphoma, with emphasis on immune system disturbances
- Relationship of diet and risk of cancer
- Factors in youth predisposing to chronic disease
- Case identification and risk factors in mental disorders

Degree Programs

Master of Science in Epidemiology
Master of Public Health with
concentration in Epidemiology
Doctor of Science
Doctor of Public Health

The master's programs provide students with basic skills in epidemiologic and quantitative methods and in computing, in preparation for research careers. The one-year training program for the Master of Science (SM) degree is open to applicants with a medical degree or equivalent biological background. It includes most of the

courses offered by the department, plus courses in principles of biostatistics, statistical methods in research, and computing principles and methods. Additional courses in areas of special interest and/or supervised research comprise the remainder of the program. The department has no master's program for students who do not have a medical degree or equivalent biological background.

The doctoral programs are designed for students who plan careers of research or teaching in epidemiology. Unless course work equivalent to that described for the SM degree has been taken previously, most of the first two years is occupied with courses. Subsequently, doctoral candidates complete a thesis and gain experience in teaching and research.

Background of Applicants Most candidates for the master's program are physicians, dentists, or veterinarians. The period of research training may be extended for qualified students by admission to either of the doctoral programs or to special student status.

The department considers applications for direct admission to the Doctor of Science (SD) program from candidates holding bachelor's degrees with strong backgrounds in biology and mathematics. For these individuals, the SD generally takes four to five years to complete; candidates with relevant doctoral degrees may complete the program in three years.

Career Outlook Some positions taken by recent graduates include officer in the Epidemic Intelligence Service, Centers for Disease Control; epidemiologists at the National Cancer Institute; and appointments at universities and medical schools in research and instruction.

For more information Please refer to the section *Degree Requirements* for general information about the degree programs. Additional information about admissions requirements and procedures can be found in the section *Admission and Registration*.

■ DEPARTMENT OF HEALTH POLICY AND MANAGEMENT

Robert J. Blendon, BA, MBA, MPH, DSc, AM (hon.), Professor of Health Policy and Management and Chairman of the Department

Faculty Professors Curran, Fineberg, Frazier, Hedley-Whyte, Hiatt, Hsiao, Newhouse, Roberts, Rosenkrantz, and Weinstein; Visiting Professor Ramalingaswami; Associate Professors Graham, Politser, Reich, and Shepard; Assistant Professors Arnold, Calkins, Kane, Mulley, Sapienza, and Thorpe; Lecturers Barnes, Barrett, Braun, Brown, P. Feldman, Hemenway, Henn, Kasten, and Palmer; Members of the Faculty Berwick, and Herzlinger

Adjunct Faculty Lecturer Vanderschmidt

The Department of Health Policy and Management is concerned with the management of health care delivery and policies to mitigate public health risks in both the United States and abroad. It is a mission-oriented department dedicated to resolving major management and health policy problems through original research and advanced training. Priorities in the department are organized in six broad areas: management of health care organizations and systems; health financing and insurance; business and labor in health; management and evaluation of medical technology; management of health hazards; and international health. The department's problem-solving orientation is exemplified by its strong ties with leading health practitioners in hospitals, HMOs, health advocacy groups, corporate medical departments, health consulting firms, state health departments, legislative committees, federal regulatory agencies, and international agencies. Practical problem-solving skills are emphasized by an interdisciplinary faculty that includes management specialists, decision analysts, accountants, physicians, lawyers, policy analysts, economists, political scientists, and program evaluators.

Activities of the Department Current areas of research include the following:

- **Management of Health Care Organizations and Systems** Applying concepts of corporate strategic planning to the challenges faced by leaders of America's major health systems; measuring and enhancing the quality of medical care; using survey methods to track long-term trends in public confidence in physicians, hospitals, and other health care providers
- **Health Financing and Insurance** Designing new systems for payment of physicians; predicting the responses of hospitals and physicians to reforms in the hospital reimbursement system; estimating the costs and benefits of increasing Medicaid coverage for uninsured poor; designing public policies to

cope with medical malpractice, litigation, and rising insurance premiums

- **Business and Labor in Health** Responses of business and labor to the AIDS epidemic; occupational health and safety; negotiation of health care benefits in the collective bargaining process
- **Medical Technology** Strategic planning by pharmaceutical firms in a regulated market environment; cost-effectiveness models of new technologies for treatment of coronary heart disease
- **Management of Health Hazards** Comparing the effectiveness of alternative AIDS prevention policies (e.g., premarital screening, contact tracing); use of risk assessment to set priorities for environmental health protection; the health benefits of exercise; new approaches to curbing drunken driving; designing clinical and policy strategies to cope with refugee trauma in the United States; assessing the magnitude of hunger in America and devising policy responses
- **International Health** Determining the cost-effectiveness of health programs (e.g., childhood vaccinations, oral rehydration therapy) in developing countries; evaluating delivery strategies for health programs in developing countries (e.g., campaigns, routine services); projecting the costs of health activities in developing countries and the means of financing them; assessing the economic costs of AIDS and the viability of control strategies

Degree Programs

Master of Science in Health Policy and Management
 Master of Science in Health Services Administration
 Master of Public Health with concentration in Health Services Administration
 Doctor of Science
 Doctor of Public Health

Areas of Concentration

Health Policy and Management
 Management of Health Care Organizations and Systems
 Management and Evaluation of Biomedical Technology
 Health Financing and Insurance
 Management of Health Hazards
 International Health
 Health Services Administration
 Policy Concentration
 Management Concentration
 International Concentration
 Concentration for Lawyers

CONCENTRATION IN HEALTH POLICY AND MANAGEMENT

The two-year Master of Science (SM) program in Health Policy and Management provides professional training for managers, policy analysts, economists, financial analysts, and others who intend to devote their careers to working on public health problems. The four key elements of the program are policy and management, an emphasis on skills and concepts, a grounding in the substance of health problems, and a curriculum which combines professional, academic, and clinical activities. The program is based on the premise that training in an academic setting must be enriched by experience in problem-solving situations and work in the field. The curriculum is applied to practical situations through a required summer internship program and an applied research program. Dr. Diana Barrett is Director of the Graduate Program in Health Policy and Management.

A set of required core courses comprises the first year. These core courses provide the basic analytic skills and knowledge needed by professionals serving in the health field. Unless they can demonstrate prior proficiency, students take the following courses:

1. EPI 200a, *Principles of Epidemiology* (2.5 units) **or** EPI 201a, *Introduction to Epidemiology* (2.5 units)
2. HPM-BIO 203b, 203c, 203d, *Statistical Methods for Health Policy and Management* (Module I, II, and III) (2.5 units each period)
3. HPM 220ab/220cd, *Administrative Systems* (10 units)
4. HPM 206ab, *Economic Analysis* (5 units)
5. HPM 279c, *Quantitative Policy Analysis* (2.5 units) **or** HPM-BIO 280c, *Decision Analysis for Health and Medical Practices* (2.5 units)
6. HPM 240a, *Toward an Agenda for Public Health* (2.5 units)

A required summer internship between the first and second years allows students to apply the skills and knowledge gained from the first year, and to acquire further understanding of career possibilities in the health field.

The second-year curriculum is designed by each student in conjunction with his or her academic adviser. Maximum flexibility is provided in order to allow students to pursue their concentrations as fully as possible. Also during the second year, students participate in an applied research program. A research project is carried out by the student under the supervision of a faculty

adviser and a leading practitioner from a public or private health organization.

The program currently has five curriculum concentrations, which translate the basic core disciplines of the department into specialized knowledge of problems and challenges facing the health sector. These concentrations are as follows:

- **Management of health care organizations and systems**, for students interested in management careers within the rapidly growing health care delivery system, including both for-profit and nonprofit enterprises
- **Management and evaluation of biomedical technology**, for students interested in strategic planning in pharmaceutical firms or careers in medical technology assessment
- **Health financing and insurance**, for students who choose career paths in the private or public sector where analytical skills in economics, accounting, and finance are critical to management or policy decisions
- **Management of health hazards**, for students interested in careers devoted to preventing diseases and injuries through design of policies for organizations such as corporations, labor unions, interest groups, public sector agencies, and legislative committees
- **International health**, for students with prior international experience and foreign language skills who are interested in management or policy careers in developing countries or in organizations that work extensively abroad

A sixth concentration in business and labor is being designed.

Each student selects a concentration toward the end of the first year of study as well as an adviser who has a special interest in that area. The student's internship, applied research project, and second-year courses are then designed to develop an in-depth knowledge of skills, issues, and trends relevant to the chosen concentration. The department offers a special seminar in each of these concentrations during the student's second year of study. The special seminar includes group discussion, topical readings, and presentations by practitioners from both the public and private sectors. During their second year students may also take courses that relate to their chosen concentration at the Harvard Graduate School of Business Administration, John F. Kennedy School of Government, and Harvard Medical School.

Background of Applicants The program seeks candidates from a wide variety of undergraduate



Dr. Robert J. Blendon, formerly senior vice president of the Robert Wood Johnson Foundation, was named chairman of the Department of Health Policy and Management in 1987.

fields whose personal characteristics, work experience, and academic record, particularly in quantitative and analytic course work, suggest outstanding potential in the areas of health policy and management. An aptitude test (GRE, GMAT, LSAT, MCAT, or DAT) is required. Applicants whose preparation appears deficient in some area, such as quantitative methods, may be offered provisional acceptance, contingent upon the successful completion of specific course work in advance of matriculation.

Candidates are expected to have at least one year of pertinent post-baccalaureate work experience in the health field, but exceptions are sometimes made for outstanding applicants. Deferred admission is available for some applicants who demonstrate strong potential in the field, but who have not had work-related exposure to the health care system. Students offered deferred admission work within the health system, in a position approved by the program, for a minimum of one year before matriculating.

CONCENTRATION IN HEALTH SERVICES ADMINISTRATION

The department offers two one-year programs in Health Services Administration, one of which leads to the Master of Science (SM) degree and the other to the Master of Public Health (MPH). Dr. David Calkins is the Director of the Master's Programs in Health Services Administration.

The SM program addresses the needs of individuals with advanced degrees or extensive experience in health or health-related fields, including law, who wish to specialize in the

areas of health policy, planning, regulation, and/or management. The MPH program prepares professionals for public health practice. Students concentrate their studies in either policy or management, while at the same time acquiring a basic foundation in the general area of health policy and management. Curriculum options are also available for students interested in international health.

The master's programs include required courses, departmental course work in a student's area of concentration chosen from offerings within the department, and several electives chosen from within or outside the department. The following courses comprise the required core:

1. EPI 200a, *Principles of Epidemiology* (2.5 units) or EPI 201a, *Introduction to Epidemiology* (2.5 units)
2. HPM 240a, *Toward an Agenda for Public Health* (2.5 units)
3. HPM 300cd, *Applied Research Tutorial* (5 units). Required for SM students only, the tutorial consists of the preparation of a written report in the student's area of concentration, focusing on a topic of interest to both the student and a member of the department's faculty. The report format may range from a case study to a research paper and, depending on the student's interests, may include field work.

Students in the MPH program must satisfy the core requirements of the MPH program as well (see *Degree Requirements*). With the exception of the applied research tutorial, students may be exempted from those requirements in which they demonstrate prior proficiency.

The **policy concentration** includes course work in decision theory, benefit-cost analysis, and the implementation of health policies and programs. The required courses for the policy concentration are as follows:

1. HPM-BIO 203b, 203c, 203d, *Statistical Methods for Health Policy and Management* (Module I, II, and III) (2.5 units each period)
2. HPM 221ab, *Managing Health Delivery Organizations* (5 units)
3. HPM 206ab, *Economic Analysis* (5 units) **or** HPM 205ab, *Economic Analysis for Public Health* (5 units)
4. HPM 280c, *Decision Analysis for Health and Medical Practices* (2.5 units)

The **management concentration** provides a broad overview of the field of management and focuses on the management of health delivery institutions and on the development of concrete management skills. The required courses for the management concentration are as follows:

1. HPM-BIO 203b, 203c, 203d, *Statistical Methods for Health Policy and Management* (Module I, II, and III) (2.5 units each period)
2. HPM 220ab/220cd, *Administrative Systems* (10 units)
3. HPM 205ab, *Economic Analysis for Public Health* (5 units) **or** HPM 206ab, *Economic Analysis* (5 units)

The concentrations for lawyers and for students interested in international health offer students a policy or management perspective while allowing the flexibility needed to design an appropriate academic program of study outside the department.

Students choosing the **international concentration** take course work in a variety of health issues related to their interests and experience in developing countries. Especially important are electives that stress the application of analytic techniques to program design, implementation, financing, and evaluation. Because of the special demands of international health, students choosing that concentration should generally have prior work experience in a developing country and working knowledge of a relevant foreign language. Previous professional credentials (e.g., physician, nurse, accountant) are also recommended. The required courses for the international concentration are as follows:

1. BIO 200ab, *Introduction to Statistical Methods* (5 units) **or** BIO 201ab, *Principles of Biostatistics* (5 units)

2. HPM 205ab, *Economic Analysis for Public Health* (5 units) **or** HPM 206ab, *Economic Analysis* (5 units)
3. HPM 222ab, *Management in Public Health in Developing Countries* (5 units)
4. HPM-POP 262cd, *Health Planning and Policy for Developing Countries* (5 units)

The **concentration for lawyers** offers a sequence of courses in health law and related subjects which can be taken as electives within either the MPH or SM degree. A suggested list of courses offered in the department is available to lawyers and provides specialization in any of three areas: medical malpractice and patient risk management, health care finance regulatory programs, and environmental health law and policy.

Background of Applicants Candidates for the SM program in Health Services Administration generally hold graduate professional degrees and have some experience in health services. Typical applicants to the program are professionals in medical or health-related disciplines who expect to devote a substantial portion of time in their careers to health policy and/or management issues, and lawyers who are interested in health law, patient's rights, and health planning and regulation.

The program is also designed to satisfy similar needs of health professionals who do not necessarily hold an advanced degree, but who have eight to ten years' work experience in the health services area with a high degree of responsibility, and who wish to undertake course work in their areas of specialization.

Applicants for the MPH degree must satisfy the requirements for admission to the school-wide MPH program.

All applicants must demonstrate through course work and aptitude test performance (GRE, GMAT, LSAT, MCAT, or DAT) the ability to master the quantitative and analytic content of the program.

DOCTOR OF SCIENCE/DOCTOR OF PUBLIC HEALTH

The doctoral program prepares its graduates to perform research at the professional level. Required courses cover health care processes and institutions, economics, statistical methods, management, and formal analytic methods. Students select both disciplinary and substantive area majors and minors. Disciplinary areas include economics, management sciences, politi-

cal science, program evaluation and experimental design, decision sciences, and statistics. Substantive areas include systems of care, health financing and insurance, management and evaluation of biomedical technology, management of health hazards, and international health. A doctoral seminar is devoted to research methods. Doctoral theses comprising original research are advised by committees of three or more faculty members. A thesis is usually comprised of three publishable papers.

Background of Applicants Applicants should have strong aptitude or competence in a quantitative discipline (demonstrated through course work, work experience, and aptitude test performance on the GRE, GMAT, MCAT, or DAT), experience in the health sector, ability to organize and perform independent projects, and good interpersonal skills. Direct admission to the doctoral program is generally reserved for persons with relevant graduate education. Persons without such education may in exceptional circumstances be directly admitted, but will generally be referred to a master's program from which their doctoral application may be made.

Career Outlook The department has developed an effective job placement mechanism which includes numerous contacts with potential employers on a national and international scale, a process which begins in the first year. A system of faculty networking as well as an extensive database of alumni and professional contacts are used to link students with a broad range of health care executives. Practitioners are often invited to the department to discuss their work and career paths. Graduates of the international concentration often are employed by an international organization; many of the foreign students assume responsible positions in their own countries. Some positions taken by recent graduates include financial manager for a health maintenance organization, administrative director of a primary care center, policy analyst for a legislative committee, consultant for an international health organization, products manager for a major corporation, and assistant director of a community health center.

For more information Please refer to the section *Degree Requirements* for general information about the degree programs. Additional information about admissions requirements and procedures can be found in the section *Admission and Registration*.

■ DEPARTMENT OF MATERNAL AND CHILD HEALTH

Isabelle Valadian, MD, MPH, Professor of Maternal and Child Health and Chairman of the Department

Faculty Professor Curran; Associate Professors Deykin, Guyer, and Sachs; Lecturers Crocker, Dwyer, Gardner, and D. Walker; Member of the Faculty Wise

The Department of Maternal and Child Health has as its primary goal the training of professionals committed to the maintenance and enhancement of the health of mothers and their children. The academic curriculum focuses on factors affecting lifelong health status and on the various health and welfare services needed by children and women of childbearing age.

The curriculum includes courses on the physical, social, and cognitive stages of human development from conception to adulthood; the content and structure of maternal and child health services; the role of governmental, private, and voluntary health agencies; and the methodology of needs assessment, policy formation, and program evaluation in maternal and child health.

Activities of the Department Current areas of research include the following:

- Patterns of growth, maturation, and behavioral, social, and nutritional changes in an aging cohort; the relationship between adult health and child health and development; statistical methodology for analyzing processes of growth and development (Longitudinal Studies of Child Health and Development, started in 1930)
- Survey and assessment of Massachusetts' health services providing care for children with chronic illness or disability
- Child abuse as a predictor of subsequent self-destructive behavior in adolescence
- Development of standards of care for children with special health care needs
- Long-term adjustment of birthparents following adoption
- Manifestations of depression in the older adolescent
- Computerized screening of pregnant women for nutritional risk
- Assessment of teen pregnancy and parenting programs
- Policies and strategies for preventing high risk adolescent behaviors

- Unintentional and violence-related injuries to children and young adults. The New England Injury Research Center and the Childhood Injury Prevention Resource Center promote research and implement injury prevention programs through action of state health departments and maternal and child health agencies

Degree Programs

Master of Science in Maternal and Child Health
 Master of Public Health with concentration in Maternal and Child Health
 Doctor of Science
 Doctor of Public Health

All concentrators in maternal and child health are urged to take courses leading to an understanding of normative physical and cognitive development, of maternal and child health services, and of the legislation supporting health and social services for mothers and their children.

The Master of Science (SM) program is designed for students who wish to focus in depth on maternal and child health. The department offers both a one-year and a two-year program, depending on the background of the student. Candidates for the one-year SM must fulfill at least 20 credit units in departmental offerings, and candidates for the two-year SM, at least 30 credit units. Occasionally, courses offered in other areas of Harvard University may be substituted to meet this requirement.

A two-year/two-degree program is available for eligible nurses to study half-time for a Master of Science in Maternal and Child Health and half-time for a Master of Science in the Primary Care Program in Parent-Child Nursing of Simmons College. The curriculum is designed to prepare nurses to provide leadership in community-oriented primary care for parents and children. Nurses interested in the two-year/two-degree program must apply to and be accepted by both the Harvard School of Public Health and Simmons College. For more information, contact Jane Gardner, DSc, in the Department of Maternal and Child Health, or Maria Bueche, EdD, Simmons College, 300 The Fenway, Boston, MA 02115. The degree in Maternal and Child Health will be awarded upon successful completion of the Master of Science in Primary Care Nursing.

The Master of Public Health (MPH) with a concentration in maternal and child health is designed primarily for established health profes-

sionals who wish to broaden their knowledge of public health policy and its application to the area of maternal and child health. Students in this program must fulfill the core curriculum of the MPH program and must also take the following courses:

1. MCH 204ab, *Content of Maternal and Child Health Programs* (5 units)
2. At least one of the following case studies courses:
 - MCH 205cd, *Planning, Implementation, and Evaluation of Maternal and Child Health Programs* (2.5 units)
 - MCH 206cd, *Maternal and Child Health in Developing Countries* (2.5 units)
3. 7.5 units from other formal courses in the Department of Maternal and Child Health

A limited number of fellowships may be available to master's degree candidates who are United States citizens concentrating in the Department of Maternal and Child Health.

Doctoral students' research activities represent a range of interests in areas of health program development and service delivery. Recent doctoral studies have included topics such as motor development of children with Downs Syndrome, an intervention program for low-birthweight infants, and obstetric risk assessment.

Background of Applicants Applicants eligible for the one-year SM program are established practitioners or investigators holding a prior master's or doctoral degree in a related field such as medicine, dentistry, nursing, social work, nutrition, physical therapy, psychology, health education, or anthropology.

Applicants eligible for the two-year SM program have either a master's degree in a field unrelated to health (such as law, education, sociology, or statistics) or a bachelor's degree in a health-related field and exceptional relevant work experience.

Applicants to the two-year/two-degree program must hold a bachelor's degree from a program accredited by the National League of Nursing, a license to practice nursing, and the equivalent of at least three years of full-time nursing experience in maternal and child health. Applicants must also meet the general admissions requirements of both the Harvard School of Public Health and Simmons College.

Applicants to the MPH program with a concentration in maternal and child health must meet the requirements of the general MPH program and have relevant experience in maternal and child health.

Applicants to the doctoral programs must have an advanced degree in a health field related to maternal and child health. Applicants are expected to have a sound academic record with documented proficiency in the quantitative sciences, relevant experience, and research interest in an area consonant with the goals of the department.

Career Outlook Graduates of the master's programs generally obtain positions in local, state, national, or international health agencies. Some positions taken by recent graduates include planner for the Indo-Chinese refugees' health programs for Rhode Island, director of maternal and child health for New Mexico, director of maternal and child health for the Emirate of Qatar, and nutrition consultant for the United States Public Health Service, Region I.

Students completing the doctoral program usually assume academic posts in graduate schools of public health, nursing, social work, and related disciplines. Others assume positions of responsibility in national and international organizations and foundations.

For more information Please refer to the section *Degree Requirements* for general information about the degree programs. Additional information about admissions requirements and procedures can be found in the section *Admission and Registration*.



Dr. Bernard Lown, Professor of Cardiology in Nutrition, was co-recipient of the 1985 Nobel Peace Prize on behalf of International Physicians for the Prevention of Nuclear War.

■ DEPARTMENT OF NUTRITION

Peter Goldman, B Eng Phys, AM, MD, Professor of Health Sciences in Nutrition and Acting Chairman of the Department

Faculty Professors Antoniadēs, Lown, and Willett; Assistant Professors Franceschi, Owen, Storch, and Sul; Lecturers Herrera-Acena, Reinhold, and Witschi

The Department of Nutrition provides training and research opportunities in basic science relating to nutrition and in practical aspects of nutrition as they affect public health. Nutrition policy and the evaluation of nutritional interventions are long-standing interests of the department, particularly as they concern problems in Latin America, Africa, and Asia, as well as in the United States. Other interests of the department range from molecular biology to human epidemiology. Students learn and use the latest techniques in biochemistry, physiology, and related fields. Research, whether basic or applied, is relevant to human health.

Activities of the Department Current areas of research include the following:

- Regulation of cell growth by hormonal growth factors and the mechanisms of such regulation
- Regulation of cellular metabolism by means of insulin and nutrients
- Use of state-of-the-art mass spectrometry to study the structure of complex carbohydrates and glycoproteins
- Pharmacological and psychological aspects of sudden cardiac death
- Preparations that transport oxygen intravenously without dependence on red cells
- Use of computers for interactive dietary analysis and counseling
- Effects of nutrition programs and methodology on the mental and physical consequences of malnutrition

Degree Programs

Master of Public Health with concentration in Nutrition
Doctor of Science
Doctor of Public Health

Areas of Concentration

Nutritional Biochemistry
Epidemiology/International Nutrition

Students in the Master of Public Health (MPH) program are required to take the following courses:

1. NUT 201a/201b, *Principles of Nutrition* (2.5 units each period)
2. NUT 204ab/204cd, *Departmental Seminars* (2.5 units each term)
3. At least one other course in the Department of Nutrition

CONCENTRATION IN NUTRITIONAL BIOCHEMISTRY

The doctoral program in nutritional biochemistry trains highly qualified individuals interested in laboratory-oriented approaches to solving nutrition and metabolic problems. Students are required to take graduate courses in biochemistry, physiology, epidemiology, biostatistics, and the following courses in nutrition:

1. NUT 201a/201b, *Principles of Nutrition* (2.5 units each period)
2. NUT 204ab/204cd, *Departmental Seminars* (2.5 units each term)
3. NUT 205cd, *Biochemistry and Physiology of Nutrition* (5 units)
4. NUT 214ab/214cd, *Research Techniques in Nutritional Biochemistry* (5 units each term)
5. 5 units from other formal courses in the Department of Nutrition

Students must also take formal course work in two minor fields, one of which must be biochemistry and the other chosen from the other basic medical sciences. Research is begun during the first year.

Background of Applicants Students with a bachelor's or master's degree may apply for admission to the Doctor of Science (SD) degree program in nutritional biochemistry. An excellent background in chemistry, biology, nutrition, or some other relevant science discipline is necessary for admission.

CONCENTRATION IN EPIDEMIOLOGY/ INTERNATIONAL NUTRITION

Some students undertake a joint doctoral program in the Departments of Nutrition and Epidemiology. This program furnishes thorough training in both of these disciplines, enabling graduates to apply sound epidemiological methods to an ever-increasing number of nutritional problems. Students in the joint program must satisfy the course requirements in both departments and must select a minor field

acceptable to both departments. The thesis will concern a topic in both nutrition and epidemiology.

Background of Applicants Admission to the joint SD degree program requires a strong background in biology and mathematics and the approval of both the Department of Nutrition and the Department of Epidemiology.

Applicants to the MPH program, the joint SD program, or the Doctor of Public Health program should contact the Department of Nutrition before formally applying.

Career Outlook Some positions taken by recent graduates include assistant professor of biochemistry at a university, assistant professor and research associate at schools of medicine, postdoctoral research fellows in medical centers and universities, nutrition research director at a major food company, nutritionist at a school of public health, director of nutrition support service in a medical center, community nutritionist for a state health project, local health clinic administrator, food analytical chemist for an industrial firm, nutritionist for a federal nutrition evaluation agency, and nutrition educator for a national Tunisian institute.

For more information Please refer to the section *Degree Requirements* for general information about the degree programs. Additional information about admissions requirements and procedures can be found in the section *Admission and Registration*.

■ DEPARTMENT OF POPULATION SCIENCES

Lincoln C. Chen, AB, MD, MPH, Taro Takemi Professor of International Health and Chairman of the Department

Faculty Professors Alonso, Dyck, J. Harrington, Levins, and Salhanick; Associate Professors Frisch, Larson, and Potter; Lecturers Berggren, Hareven, and Stark; Members of the Faculty Lewontin and Seeley

The Department of Demography and Human Ecology was established in 1962 (renamed the Department of Population Sciences in 1969) and the Center for Population Studies in 1964 (see *International Health*). These actions were taken under the conviction that rapid population growth hampers efforts to provide better housing, education, nutrition, health services, and medical care, and that the disparity between rates of population increase and rates of development of human and economic resources is a

crucial problem in many parts of the world. As the view of the role of population change in health and welfare has matured, increasing attention has been given to questions of the broader interrelations among population structure, health and welfare, and social change in both developing and industrialized countries.

Faculty affiliated with the department are specialists in biology, biostatistics, demography, ethics, economics, sociology, ecology, genetics, medicine, and community-oriented public health. The department's degree programs prepare students to participate in population programs as administrators, researchers, and educators. They aim to develop sophistication in data and information management and evaluation, and to provide a broad philosophical perspective on problems and issues in the population field and on related issues of health and health care affecting communities.

A large percentage of the students in the department are from or are primarily interested in health and population problems of developing countries. Each year, the department sponsors a field visit to Haiti.

Activities of the Department Current areas of research include the following:

- Biochemical and endocrinologic mechanisms controlling fertility
- Long-term impact of demographic changes within the United States
- Interactions of fertility, income distribution, and other aspects of socio-economic development
- Interactions of family planning with fertility, nutrition, and infectious diseases within defined communities
- Community diagnoses of causes of rates of birth, death, and migrations
- Biological aspects of population programs
- Ethical aspects of population policies and programs
- Analysis of data collected in field studies in developing countries, including studies of mortality, morbidity, nutrition status, fertility, and impact of programs
- Factors that might improve food production
- Mathematical and experimental study of human ecosystems

Degree Programs

Master of Science in Population Sciences
 Master of Public Health with concentration
 in Population Sciences
 Doctor of Science
 Doctor of Public Health

Programs of study are offered in the areas of population, health, and nutrition; the design, management, and evaluation of population programs; the analysis of complex ecological systems; demographic analyses; reproductive biomedicine; and community-oriented public health. The programs of individual degree candidates vary widely, reflecting the diversity of the students' backgrounds, national origins, previous education, areas of professional concern, and career goals.

Background of Applicants Students with bachelor's degrees in biological sciences, social sciences, or other population-related fields generally spend two years in residence toward the Master of Science (SM) degree. Students with advanced degrees or with extensive work experience generally complete study toward the SM degree in one year. Approximately one-fourth to one-half of those who complete the SM degree enter the doctoral program.

Career Outlook Some positions taken by recent graduates include director of a university center for population studies, principal statistician, executive secretary of an international committee on applied research in population, president of a medical services consultants' group, medical director of a planned parenthood association, director of a medical clinic, program officer for the United Nations Fund for Population Activities (UNFPA), UNFPA coordinator, population intern for USAID, and associate program officer in health and nutrition for UNICEF.

For more information Please refer to the section *Degree Requirements* for general information about the degree programs. Additional information about admissions requirements and procedures can be found in the section *Admission and Registration*.

■ LABORATORY OF TOXICOLOGY

Armen H. Tashjian, Jr., MD, Professor of Toxicology and Director of the Laboratory

Faculty Associate Professors Rhee and Toseano; Assistant Professors Samson and Schlegel

Adjunct Faculty Lecturer Ofner

Toxicology is the study of the injurious effects of chemicals. The scope of modern toxicology is broad and depends on the integration of knowledge and techniques from the medical, biological, chemical, and physical sciences. The faculty and staff of the laboratory reflect this multidisciplinary aspect of toxicology.

Activities of the Laboratory Current areas of research include the following:

- Receptor-mediated toxicity
- Tumor promotion
- Biochemical regulation of cellular toxicity
- Molecular toxicology
- Mechanisms of dioxin action and toxicity
- Molecular biology of DNA repair and mutagenesis in procaryotes and eucaryotes
- Development and use of animal and human cell culture models
- Regulation of early mitotic events in mammalian cells

Degree Programs

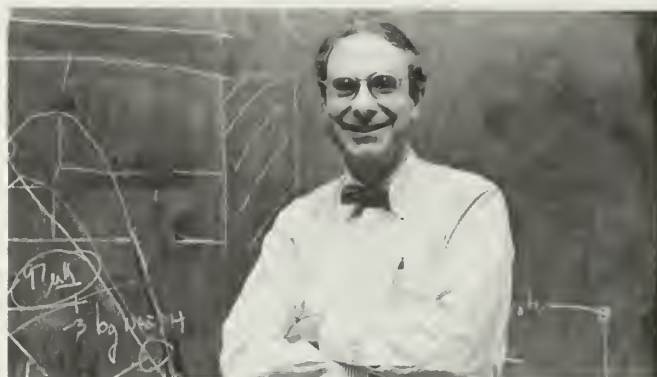
Doctor of Science, granted by the Harvard School of Public Health

Doctor of Philosophy in Pharmacology (Toxicology), granted by the Division of Medical Sciences of the Faculty of Arts and Sciences

The degree granted is determined by route of entry.

The research and training program in toxicology provides students with knowledge of the health implications of environmental chemicals, interactions of toxic agents with cellular systems, biochemical mechanisms of toxicity, identification of toxic environmental chemicals, and prevention or reversal of adverse effects where possible.

The first year is usually devoted to course work. Students take courses at the Harvard School of Public Health, the Division of Medical Sciences, and other Harvard graduate programs. Appropriate courses may also be taken at MIT. Students



Dr. Armen H. Tashjian, Jr., Professor of Toxicology and Director of the Laboratory of Toxicology, has major research interests in tumor promotion, regulation of differentiated functions in cancer cells, and neuroendocrine transduction mechanisms.

are expected to pass a qualifying examination before the end of the fourth semester and complete thesis research within four to five years of residence.

First-year students have the opportunity to broaden their research skills by rotations in at least three different laboratories for ten weeks each. The laboratory rotation experience is supervised by each laboratory head and enables students to become familiar with a variety of research problems and techniques. At the end of each rotation, students prepare a brief written report and give an oral presentation.

Students participate in journal clubs and weekly laboratory research meetings. Students who are well advanced in their thesis research are encouraged to present their research at appropriate regional and national scientific meetings.

Background of Applicants Candidates should have a bachelor's degree and demonstrated knowledge of organic, physical, and biological chemistry, general biology, physics, and calculus. A personal interview is strongly encouraged. The Graduate Record Examination (GRE) is required.

Career Outlook Some positions taken by recent graduates include postdoctoral research fellowships at academic institutions, junior faculty positions, and staff positions at federal agencies.

For more information Please refer to the section *Degree Requirements* for general information about the degree programs. Additional information about admissions requirements and procedures can be found in the section *Admission and Registration*.

For a brochure detailing the program and the interests of its faculty, contact Elizabeth Remar, Administrator, Laboratory of Toxicology, 665 Huntington Avenue, Boston, MA 02115 (telephone 617-732-1178).

■ DEPARTMENT OF TROPICAL PUBLIC HEALTH

John R. David, AB, MD, AM (hon.), John LaPorte Given Professor of Tropical Public Health and Chairman of the Department

Faculty Professors Chernin, Pan, and Spielman; Associate Professors Caulfield, Piessens, and Wirth; Assistant Professors Cattani, Harn, James, Jungery, Maguire, Peattie, Ribeiro, Shoemaker, and Titus; Lecturer Cash

Parasitic diseases are a major health problem in the developing world, particularly in tropical regions. In the Department of Tropical Public Health, research and teaching center on the biological and ecological aspects of protozoan and helminthic diseases, as well as tuberculosis and Lyme disease. The department offers opportunities for basic study of the biology of parasitism and practical work aimed at development of better tools for diagnosis, vaccine, and control. The program accepts students at the master's, doctoral, and postdoctoral levels.

A Program of Tropical Medicine and International Health has been developed involving the faculty of the Department of Tropical Public Health at the School of Public Health and the Division of Tropical Medicine at Harvard Medical School. The program takes a multidisciplinary



Dr. Dyann Wirth, Associate Professor of Tropical Public Health, and colleague Robert Barker have developed a breakthrough diagnostic screening method for malaria.

approach to parasitic diseases, using immunology, molecular biology, medical entomology, cell biology and ultrastructure, biochemistry, pathology, and epidemiology. The program includes research within the schools and field collaborations overseas in Brazil, Venezuela, Colombia, Mexico, Kenya, Sri Lanka, Egypt, Thailand, India, China, and Indonesia.

Activities of the Department Current areas of research include the following:

- Immunology of schistosomiasis, leishmaniasis, and tuberculosis
- Immunology of filariasis and onchocerciasis
- Control of gene expression in *Plasmodium sp.* and *Leishmania sp.*
- Development of DNA probes to detect parasite infections
- Molecular biology of *Giardia* and *Entamoeba sp.*
- Receptor function and endocytosis in *Plasmodium falciparum*
- Epidemiology of leishmaniasis, malaria, and schistosomiasis
- Medical entomology and ecology of Lyme disease
- Molecular biology of insect vectors
- Biochemistry, immunology, and pharmacology of insect saliva
- Parasitology

Degree Programs

Master of Science in Tropical Public Health
Master of Public Health with concentration in Tropical Public Health
Doctor of Science
Doctor of Public Health

Areas of Concentration

Tropical Public Health
Biology and Epidemiology of Parasites
Vector Biology, Ecology, and Control

CONCENTRATION IN TROPICAL PUBLIC HEALTH

The basic course (TPH 201a) provides students with a comprehensive understanding of the major parasitic diseases, emphasizing epidemiology and control. Other courses deal with various aspects of parasitism, particularly the biology, immunology, molecular biology, vector biology, cell biology, and pathology associated with parasites and their vectors. Although ecological,

epidemiological, political, and social aspects relevant to control of infectious agents are integrated into the teaching programs, the focus of the department's research remains primarily in the biological aspects of the host-parasite relationship.

This program, which leads to the Master of Public Health (MPH) degree, provides students trained in the health sciences with the background necessary to promote research or service careers in developing countries. It introduces students to the significance, recognition, and prevention of the major infectious disease problems of developing countries. Students satisfy basic course requirements in biostatistics, epidemiology, and tropical public health, along with other distribution requirements of the MPH program.

Students take specialized courses offered by the department according to their area of interest and future needs. In addition to the courses offered in the Department of Tropical Public Health, students preparing for a career in international health should take courses offered by other departments, focusing on allocation of resources and on the social, economic, and political factors in public health.

Background of Applicants The MPH with concentration in Tropical Public Health is designed for persons with prior medical, dental, veterinary, or biomedical science degrees who are interested in problems of infectious diseases in developing countries.

CONCENTRATION IN THE BIOLOGY AND EPIDEMIOLOGY OF PARASITES

This program introduces students to recent advances in the area of biology and epidemiology of parasitic diseases and provides background for conducting research on these diseases. Emphasis is placed on molecular biology, immunology, cell biology, and epidemiology. In this concentration, the Master of Science (SM) degree is usually regarded as preparation for the Doctor of Science (SD) program.

Students satisfy basic course requirements in tropical public health, biostatistics, and epidemiology, and take advanced courses in this department as well as at the Harvard Medical School and at the Harvard Graduate School of Arts and Sciences. Students are expected to enroll in tutorials or to carry out laboratory research projects in addition to their formal course work. The research program emphasizes molecular biology, immunology, cell biology, and epidemiology of parasites.

Background of Applicants Students in this program have at least a bachelor's degree but can enter at any level of advanced training, including the postdoctoral level.

CONCENTRATION IN VECTOR BIOLOGY, ECOLOGY, AND CONTROL

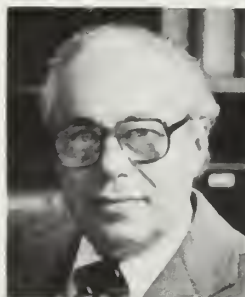
This program introduces students to the various arthropod and molluscan vectors of human infection and develops an appreciation for the biology of these organisms and the means for their control. It prepares students to plan and evaluate control programs and develops skills with respect to identification, maintenance, and experimental procedures involving these organisms.

In addition to required courses in epidemiology and biostatistics, participants in the program take courses in vector biology, molecular biology, immunology, and parasitology. Depending upon the particular interest of each student, courses in cell biology, invertebrate physiology, pathology, genetics, population ecology, and computer sciences may be required. The research program emphasizes experimental ecology, biochemistry, physiology, and molecular genetics.

Background of Applicants Students in this program normally have at least a bachelor's degree, but can enter at any level of advanced training, including the postdoctoral level.

Career Outlook Some positions taken by recent graduates include academic and administrative posts in programs dealing with the control of tropical, parasitic, and vector-borne diseases or with research on these entities. Posts are in the public and private sectors and at the national and international levels.

For more information Please refer to the section *Degree Requirements* for general information about the degree programs. Additional information about admission requirements and procedures can be found in the section *Admission and Registration*.



Dr. Elkan Blout, Dean for Academic Affairs and Director of the Division of Biological Sciences in Public Health.

DIVISION OF BIOLOGICAL SCIENCES IN PUBLIC HEALTH

Elkan R. Blout, AB, PhD, AM (hon.), DSc (hon.), Professor in the Faculty of Public Health, Dean for Academic Affairs, and Director of the Division of Biological Sciences in Public Health

The goal of the Division of Biological Sciences in Public Health is to strengthen the scientific basis and application of biological knowledge and methodology to major issues of public health. To accomplish this, the division brings together faculty members and training programs from departments with strong biological components, including Cancer Biology, Environmental Science and Physiology, Nutrition, Population Sciences, and Tropical Public Health, as well as the Laboratory of Toxicology. Members of the Departments of Biostatistics and Epidemiology also share the division's goals.

Through the division, the school offers a multidisciplinary doctoral program in biological sciences in public health. The division is designed to provide training for able students committed to a career in this field who have not yet selected an area of concentration. Students are admitted to the division as candidates for a Doctor of Science degree. The degree is in the department or discipline in which the student performs thesis research. Applicants who have already chosen a field of study should apply directly to the appropriate department, rather than to the division.

Degree Program Doctor of Science

Students in the division take courses for one to two years to gain a thorough grounding in the biological sciences and in elements of the biomedical sciences and epidemiology. In the first year, students rotate for ten-week periods through various laboratories and participate in division-sponsored seminars. This prepares students to make an informed choice of topic and academic adviser before embarking on doctoral thesis research, which ordinarily requires three to four years to complete.

Course requirements are flexible to accommodate students with diverse backgrounds and career goals. With their advisers, students select a program that might include courses in biochemistry, cell biology, pharmacology, virology, immunology, genetics, and physiology. Twenty credit units of coursework are specified:

1. ID 205ab/205cd, *Interdepartmental Seminar in the Biological Sciences*. 2.5 units each term. Research seminars by division faculty.
2. ID 207ab, *Papers in the Biological Sciences: Past and Present*. 2.5 units. Discussion of "classic" papers in biology from the perspective of logic and experimental design.
3. ESP-BIO 207cd, *Statistical Methods in Biology*. 5 units. Designed to provide competence in the major statistical methods essential for laboratory research.
4. ESP 221cd, *Methodology in Cell Biology*. 5 units. An overview of experimental approaches in cell biology used to study cell structure and function.
5. EPI 201a, *Introduction to Epidemiology*. 2.5 units. Basic principles and methods of epidemiology.

Background of Applicants Applicants generally have a bachelor's degree and demonstrated competence in organic and biological chemistry, general biology, physics, and calculus. Applicants deficient in one of these areas may be admitted provisionally, on the basis that appropriate courses are taken before and/or after entry. Three letters of evaluation are required from instructors of science and mathematics, and applicants who have worked in relevant areas should also supply evaluation letters from employers. The Graduate Record Examination (GRE) is required. Applicants wishing to visit the school are encouraged to come for an interview.

Financial Aid The division provides eligible students with two years of financial support (full tuition plus stipend). Thereafter, the student is supported by the department or laboratory in which the thesis work is conducted.

For more information Please refer to the section *Degree Requirements* for general information about the Doctor of Science degree. The section *Departments and Laboratories* provides information about departmental concentrations. Applicants to the Division of Biological Sciences should contact the division before formally applying. Please contact Rebecca Siebens, DBS Coordinator, 665 Huntington Avenue, Room 1302, Boston, MA 02115 (telephone 617-732-0926).

INTERNATIONAL HEALTH PROGRAMS

Lincoln C. Chen, AB, MD, MPH, Taro Takemi Professor of International Health

The International Health Programs seek to promote international health research and education throughout the Harvard School of Public Health. Faculty members associated with the International Health Programs all have appointments in academic departments within the school, and join the International Health Programs to pursue interdisciplinary and interdepartmental research and educational activities.

The educational activities of the International Health Programs are designed to strengthen the school's educational programs in international health. These programs are of four types. First are master's-level degree programs (MPH, SM) of one or two years for students interested in international public health professional practice. (See *Health Policy and Management, Population Sciences*, and other departments for program descriptions.) Second, the International Health Programs aim to strengthen the international health component of doctoral training programs based in various departments of the school. Third, at the postdoctoral level, the Takemi Program in International Health provides a base for nondegree interdisciplinary research by mid-career Fellows. Finally, the school occasionally offers short-term executive or overseas training programs. Overseas programs administered by the International Health Programs and by departments and faculties provide opportunities for study, research, and service, often in collaboration with overseas educational and research institutions.

■ PROGRAM FOR PROFESSIONAL EDUCATION IN INTERNATIONAL HEALTH

Richard A. Cash, SB, MD, MPH, Director of the Program for Professional Education in International Health and Lecturer on Tropical Public Health

The Program for Professional Education in International Health advises and guides master's-level degree students interested in international health in the selection of appropriate programs and courses, and participates in the coordination of international health activities within the school.

Although the school does not offer degrees in international health, it does provide numerous

opportunities for students interested in teaching, research, and service in international health, with particular emphasis on health problems of developing countries. Special courses are offered that focus primarily on developing countries, including courses on international health policy, parasitic and infectious diseases, nutrition and maternal and child health, health services, health planning, management, and program implementation. Case studies and illustrative materials from developing countries are included in readings and discussions in the core curriculum and in many other courses.

In addition to the courses regularly available in the school, tutorials and courses can be arranged where the interests of students and faculty members coincide. During the 1987-88 academic year, for example, a course was developed entitled *Transformation of the Health Sector in South Africa: Obstacles and Possibilities*. Cross-registration opportunities for students interested in medicine, economics, public administration, education, anthropology, government, social relations, and additional subject areas are available in other faculties within Harvard University and also at MIT.

Faculty members active in international health have had experience in Latin America and the Caribbean, Africa, Asia, and the Middle East. They are drawn from various departments and faculties throughout the university, giving international health an interdisciplinary orientation. Students at the school last year came from more than forty different countries.



The 1987-88 Takemi Fellows, from left to right: Emmanuel Max, Alberto Alzate, Allan Schapira, Asma Fozia Qureshi, Eustace Muhondwa, Jonathan Myers, Kazuyuki Omae, and Ramesh Durvasula.

Field Experience and Study

The School of Public Health encourages all students interested in international health to gain field experience overseas. During the 1987-88 school year students participated in courses in Haiti and Mexico and individual students were involved in projects in over twelve countries.

Students concentrating in international health in Health Policy and Management and other departments often fulfill their summer internship requirements overseas or with an international organization in the United States. Faculty may assist students in locating placements, and limited school funds are available for travel.

During the summer of 1989 a noncredit course in field-based epidemiology will again be offered in Mexico City. This course focuses on one specific health problem and appropriate techniques for addressing that problem. Two topics recently studied are malnutrition and the control of diarrheal diseases. The course will meet eight hours a day, five days a week, for four weeks. Permission of the instructor and fluency in Spanish are required. Enrollment is limited to ten students. For more information, please contact Dr. Richard A. Cash, International Health Programs, Harvard School of Public Health, 665 Huntington Avenue, Boston, MA 02115 (telephone 617-732-1076).

■ TAKEMI PROGRAM IN INTERNATIONAL HEALTH

Michael R. Reich, AB, AM, PhD, Executive Director of the Takemi Program in International Health and Associate Professor of International Health

The Takemi Program in International Health offers fellowships for research and advanced training on critical issues of international health, especially those related to developing countries. The program addresses problems of mobilizing, allocating, and managing scarce resources to improve health, and of designing solid strategies for disease control and health promotion. Through its fellowships, the program aims to contribute to institutional development and improvement of national policy in the individual's home country, and to the advancement of general knowledge. The program is named for Dr. Taro Takemi, the distinguished

physician-scientist who served for more than 25 years as president of the Japan Medical Association.

The primary goals of research under the Takemi Program are to investigate how resources are allocated and used for health purposes in both rich and poor countries and to develop methods for making such choices more rational and equitable. The program also strives to promote cooperative research and comparative analysis of health policies and programs in different countries, and to study transnational causes of ill health, such as population migration and disease transmission, and air and water pollution.

Currently, the program's research focuses on a few of the world's most urgent health needs, particularly those of the developing countries, and the most effective ways to meet them. Areas of research have a strong practical emphasis and include the assessment of health technology; the structure, organization, and financing of health care; and the relationships among rapid population growth, increasing pressures on the environment, and health status. In all areas of research, the program emphasizes the social and cultural factors that shape a country's efforts to improve health.

Each Takemi Fellow is responsible for a specific research project. Fellows use data they bring with them, and the projects are closely linked to action programs and to the work Takemi Fellows will do after returning home. Program findings and results are disseminated widely, and opportunities are sought to apply them in various settings.

Fellows also participate in the weekly Takemi seminar. As the program's teaching activity, these seminars examine the question of how to set priorities under conditions of limited resources and evolving technology. The program sponsors several open lectures each year to discuss important issues in international health, to explore possible research themes for the program, and to educate Harvard students and faculty on the state of knowledge and research in international health.

The Takemi Program is not degree oriented, as course requirements would substantially reduce the time available for research and writing. Upon completion of the program, Takemi Fellows receive a certificate. Takemi Fellowships are generally awarded for ten months. Most Takemi Fellows are supported by external funds raised by the Fellow in cooperation with the program staff.

Background of Applicants Applicants for Takemi Fellowships are highly qualified young and mid-career professionals and scholars from around the world with backgrounds in public health, medicine, economics, administration, biological science, and other fields.

■ CENTER FOR POPULATION STUDIES

Lincoln C. Chen, AB, MD, MPH, Taro Takemi Professor of International Health and Director of the Center for Population Studies

The Center for Population Studies was established in Cambridge in 1964 under the leadership of the Harvard School of Public Health as a university-wide center for the study of human population problems. The members and research associates of the center are drawn from the departments of Biology, Economics, Government, Sociology, and the Division of Applied Sciences in the Graduate School of Arts and Sciences; from the faculties of Public Health, Design, Divinity, Education, Government, and Medicine; and from MIT.

The present research programs of the center focus on several themes: economic, social, and environmental causes and effects of population change and their implications for population policy; problems of urbanization and migration in both developed and developing countries; the population of China; the influence of health care on contraceptive use and breast feeding; and the effect of nutrition and exercise on women's reproductive health.

Two-year fellowships based at the center are available for dissertation research in issues related to migration and development. Doctoral candidates in any Harvard or MIT department who have successfully completed the necessary written examination and course requirements can be considered for a fellowship award. Interested students should consult with the center and its program director in the migration and development program for further information.



Dr. Rose Frisch, Associate Professor of Population Studies, authored a study on the decreased risk of breast cancer and cancers of the reproductive system for women who were college athletes.

■ HARVARD INSTITUTE FOR INTERNATIONAL DEVELOPMENT

Albert E. Henn, SB, MD, MPH, Associate Director for Health Programs

Located in Cambridge, Massachusetts, the Harvard Institute for International Development (HIID) provides technical assistance to developing countries on programs, strategies, and policies that promote health and development. Many of the staff of HIID hold joint appointments in HIID and the School of Public Health. These faculty undertake research and teaching related to public health issues. Students may find opportunities to collaborate with HIID activities in Cambridge during the school year through the work-study program. Other students may gain field experience through participation in overseas projects. Selected students may receive fellowships to work with HIID following graduation.

■ SPECIAL PROGRAMS AND PROJECTS

The following are programs and projects located in the International Health Programs. Selected opportunities may be available for students in research or training in connection with these projects.

Commission on Health Research for Development

The Commission on Health Research for Development is an independent international organization, most of whose members come from developing countries. Funded by fifteen foundations and international agencies, the commission is analyzing the strengths, weaknesses, and gaps in current research on health problems in developing countries and reviewing current major international support programs. It will make proposals and promote actions to strengthen the capacity of developing countries to identify and solve their own health problems through basic and applied health research. The commission was launched in November, 1987, and a report of its findings will follow the final meeting in November, 1989. The secretariat of the commission is operated by the International Health Programs of the Harvard School of Public Health, backed by consultants and advisers from many countries of the world.

International Research Network on AIDS and Reproductive Health

The Harvard School of Public Health serves as the support base for a multidisciplinary international scientific network on AIDS and reproductive health. This network provides stable long-term scientific and training opportunities and promotes exchange of information on AIDS research and prevention on the international, national, and regional levels, with a special focus in African countries. Strategies for epidemiological research, health education, communication, and health promotion are emphasized. Participants in the network pursue their own research while also learning from the experiences of others working on similar problems in other settings. Harvard is a coequal member of the network, focusing on AIDS in the United States.

India-Harvard Exchange in Health Policy and Management

A widening program for cooperation and exchange of professionals is underway between India and the Harvard School of Public Health. This venture will involve a coequal exchange of students, faculty, and collaborative research in health economics and financing, health management information systems, and field epidemiology in India. Joint course development and collaborative research will follow. Arrangements have been made for short-term exchanges of students and faculty. This project has potential for improving the understanding of health and development and the role of government policies in shaping health improvement in India and internationally.

POSTDOCTORAL AND SPECIAL PROGRAMS

■ POSTDOCTORAL FELLOWSHIPS

Some departments, particularly laboratory-oriented areas such as Cancer Biology and Tropical Public Health, offer opportunities for postdoctoral research and training. Research fellows generally work with principal investigators on continuing research projects and may also serve as teaching assistants. Research fellows may be salaried, may be offered a tax-exempt stipend, or may be required to supply their own funding from public or private sources. For more information about postdoctoral opportunities, contact the administrator or chairman of the relevant department.

■ INTERDISCIPLINARY PROGRAMS IN HEALTH

Postdoctoral Program

Donald F. Hornig, SB, PhD, Professor of Chemistry in Public Health and Director of Interdisciplinary Programs in Health; John S. Evans, BSE, SM, SM, SD, Associate Professor of Environmental Science and Director of the Program in Environmental Health and Public Policy

The Program in Environmental Health and Public Policy was launched in 1977 as part of the Interdisciplinary Programs in Health. Its primary objective is to enlist scholars from the natural and social sciences in finding new ways to deal with the critical environmental problems of today's society. It aims to bring to environmental problems the knowledge, skills, insights, and analytic techniques of a variety of disciplines. Based at the School of Public Health, it is a university-wide program in which members of the faculties of Arts and Sciences, Government, Law, Medicine, and Business participate. It is not a degree-granting program.

The program focuses on the scientific and analytic foundations for environmental decisions. Its aim is to provide a core around which to focus the talents and energies of individuals and groups within the Harvard community on the problems of environmental health and public policy. The central environmental dilemma facing a modern society is that the process of growth and change unavoidably introduces environmental hazards as well as benefits. These hazards must be identified, characterized, and evaluated; their relation to the social, economic,

and health goals of the society must be analyzed; decisions must be made and laws and regulations written to mitigate the hazards as far as possible while encouraging the development of the society.

Within the central theme of the understanding of environmental hazards and their management, the three main foci of the program are as follows:

- Identifying and characterizing environmental chemicals as well as understanding the mechanism of their action at the molecular and cellular levels
- Tracing the flow of pollutants through aquifers, the atmosphere, and soils and relating the exposure of populations to their transport and ultimate fate
- Studying and analyzing alternative approaches to regulation after assembling the data needed for the technical, economic, and political assessment of environmental risk

IPH FELLOWS

Postdoctoral fellowships are awarded for terms of one or two years and may be renewable for a third year. Fellows devote their initial period to orientation, exploration of opportunities, and selection of projects and advisers. Experimental facilities are available in the laboratories of existing research groups. It is expected that during the term of a fellowship a substantial investigation or analysis will be completed.

Background of Applicants Fellows are promising graduates of advanced degree programs who seek preparation for careers in which their talents can be applied to environmental health-related problems, either through fundamental or applied research or through service. Fellows are chosen from the natural sciences (chemistry, biology, biochemistry, physics, and mathematics), the quantitative analytic areas (statistics, operations research, engineering, computer science, etc.), and the social sciences (economics, sociology, public policy, law, management, etc.).

VISITING SCIENTISTS AND SCHOLARS

Visitors may be on leave from universities, industry, or public interest organizations. Appli-

cants should submit a curriculum vitae, a list of publications, a proposal for research or study to be undertaken in IPH, and a statement of the relation of IPH to their career objectives. Stipends may be available, depending on individual circumstances and the availability of other support to the applicant.

Background of Applicants Visitors fall into two general categories: (1) Senior scientists and scholars who have made significant contributions in a discipline and now wish to apply their discipline to environmental health-related problems, and (2) individuals from government, industry, or public interest organizations who have been involved in problems of environmental health and regulation and wish to broaden their background and perspective.

■ PROGRAM IN HUMAN ECOLOGY

Special Doctoral Program

Richard Levins, AB, PhD, AM (hon.), John Rock Professor of Population Sciences and Head of the Program in Human Ecology

The study of human ecology in a public health context integrates social, historical, and ecological aspects of human existence in order to understand and influence the improvement of health in populations and communities. The Program in Human Ecology is an interdepartmental research and teaching program including faculty from the Department of Population Sciences and other areas. The program emphasizes the inseparability of biological and social components of the patterns of health and disease, agriculture, environmental protection, and resource use within a framework of complex systems analysis.

Degree candidates usually take further training in quantitative and qualitative mathematical approaches to complex systems, general and human ecology, and demography. Advanced courses relevant to each student's research interests are available as electives. These might include agricultural systems and production, population ecology, ecological anthropology, specialized courses in tropical public health, environmental sciences, and biology.

Background of Applicants Applicants are accepted into a doctoral program in one of the school's departments and must meet that department's admission and degree requirements as well as those of the Program in

Human Ecology. Potential applicants should contact Dr. Levins to indicate their interest in being considered for the program.

■ PROGRAM IN CLINICAL EFFECTIVENESS

Special Master's Program Affiliated with the Brigham and Women's Hospital Research Training Program in Clinical Effectiveness

Howard H. Hiatt, MD, ScD (hon.), Professor of Medicine and Director of the Program in Clinical Effectiveness; Lee Goldman, BA, MD, MPH, Associate Professor of Medicine

This program is intended for physicians who have completed their residencies and wish to prepare themselves for careers in clinical research, and for nurses with similar goals. The degree requirements include an intensive summer session of didactic training in biostatistics, epidemiology, decision sciences, and health economics. This is followed by research in the clinical department in which they have previously been accepted, together with graduate work that will lead to a Master of Science degree in Biostatistics, Epidemiology, or Health Policy and Management. Most participants in the program spread their academic and clinical work over two years.

Application should be made to Dr. Hiatt or Dr. Goldman, Department of Medicine, Brigham and Women's Hospital, 75 Francis Street, Boston, MA 02115.

■ PUBLIC HEALTH FOR LAWYERS

Special Master's Program

William J. Curran, JD, LL.M., SM in Hyg., LL.D. (hon.), Frances Glessner Lee Professor of Legal Medicine and Head of the Program in Public Health for Lawyers

The dramatic expansion of legal and regulatory issues in health fields has resulted in a critical need for lawyers with formal training in the health sciences and disciplines. Growing specialty fields include hospital and health care law, personal injury and compensation law, environmental health law, occupational health and safety law, and child health law. To help meet the need for trained professionals in these areas, the Harvard School of Public Health invites lawyers to apply to its one-year Master of Public Health (MPH) program.

The MPH program provides an incisive overview of the health field while offering specialized options for professional training in a variety of areas. Lawyers may pursue a comprehensive program in the health sciences and medical care delivery, or may tailor their programs to pursue special interests, such as the following:

- Health systems regulation and planning
- Medical malpractice and risk management
- Environmental health
- Occupational health and safety
- International health
- Mental health
- Population science
- Child growth and development
- Legal medicine and death investigation
- Medical ethics and human rights

To supplement their studies, students may avail themselves of course offerings in other faculties of Harvard University such as the Law School, Medical School, and John F. Kennedy School of Government.

Lawyers normally apply to the MPH General Program. Lawyers interested in applying to other programs should consult with Dr. William J. Curran, Head of the Program in Public Health for Lawyers (telephone 617-732-1090), or with Bernita L. Anderson, Director of Professional Development (telephone 617-732-1036).

Background of Applicants In addition to a law degree, applicants should have an aptitude for public health studies, as evidenced by undergraduate courses in relevant areas such as statistics, biology, economics, political science, psychology, and health sciences. Most applicants have been in law practice for several years, preferably in health law areas. Recent law school graduates who show special promise for health law careers are also encouraged to apply.

■ PUBLIC HEALTH FOR DENTISTS

Special Master's Program

Chester W. Douglass, DDS, MPH, PhD, Lecturer on Public Health Dentistry and Head of the Department of Dental Care Administration at the Harvard School of Dental Medicine

Dentists enroll in many of the degree programs at the Harvard School of Public Health, particularly in the Departments of Health Policy and Management, Epidemiology, and Maternal and



Sev Fluss, Chief of Health Legislation for the World Health Organization (left), and HSPH Dean Harvey Fineberg at the dedication of the Harvard-WHO Legislative Center.

Child Health, as well as in the MPH General Program. The school cooperates with the Harvard School of Dental Medicine to offer a three-year postdoctoral fellowship program which leads to a public health degree and dental specialty certificate, as described below.

Postdoctoral Fellowship Program in Dental Public Health, Epidemiology, and Dental Care Administration This program prepares individuals for creative full-time teaching, research, and administrative careers in dental public health, epidemiology, and dental care administration. Participants in the program are appointed as Clinical or Research Fellows in Dental Care Administration at the School of Dental Medicine.

The program comprises three parts of approximately one year each. One part of the program involves a formal course of study leading to a Master of Science or Master of Public Health degree. Fellows must complete the core courses in the first year at the Harvard School of Public Health, and must complete all requirements for the degree within two academic years. Candidates with an equivalent degree from another school, however, may be accepted into the program with one year advanced standing.

The second portion of the program involves a one-year supervised residency at the commu-

nity, state, or national level in epidemiology or health policy and administration. This residency meets the requirements of the American Board of Dental Public Health. The third portion affords opportunity for advanced study and research at the Harvard Schools of Dental Medicine and Public Health, at other Harvard schools, and at other institutions. Fellows may carry on epidemiological or health services research over the entire three-year period in a variety of situations involving either new or continued studies. Each participant in the program prepares a research thesis for presentation at the end of the third year.

In addition to the master's degree, candidates receive a certificate of completion of residency requirements from the Harvard School of Dental Medicine. Several doctoral programs are available for fourth- and fifth-year fellows.

Background of Applicants The Postdoctoral Fellowship Program is open to dentists and other qualified health professionals who meet the admission requirements of both participating schools. Application should be made to the School of Dental Medicine, whose Committee on Postdoctoral Education will forward the applicant's file to the School of Public Health for consideration.

■ COMMUNITY HEALTH IMPROVEMENT PROGRAM

Special Nondegree Program

J. Larry Brown, AB, AM, MSW, PhD, Lecturer on Health Services and Director of the Community Health Improvement Program

The Community Health Improvement Program (CHIP) is a community service and policy analysis component of the Harvard School of Public Health. CHIP's objectives are to improve the health status of communities by developing, implementing, and evaluating innovative community-based public health strategies in conjunction with community agencies, and to carry out field-based research on critical public health issues as the basis for preparation of national policy reports. CHIP addresses primarily the areas of environmental health, nutrition, and hunger, and primary care for low-income and underserved populations.

The research and service goals of CHIP are fulfilled by faculty, students, and CHIP staff who work with community agency personnel to

improve the equity, efficiency, and effectiveness of health service delivery. Participants also seek to increase the usefulness of policy-relevant information and evaluation techniques.

CHIP demonstration and research projects are guided by more general needs for new public knowledge and understanding. These projects are developed by CHIP staff, faculty members associated with CHIP, colleagues from teaching hospitals and schools of public health across the nation, and students.

CHIP's recent undertakings and publications include *Hunger in America: The Growing Epidemic* (1985, Wesleyan University Press) and "Developing a Community Agenda to Combat Environmental Toxins," a 17-unit educational videotape series.



Dr. J. Larry Brown, Lecturer on Health Services and Director of the Community Health Improvement Program, presents research gathered on hunger in America.

CENTERS AND OFFICES

The Harvard School of Public Health supplements its departmental research and teaching programs by supporting several centers. These units enrich the school's intellectual environment and expand students' academic opportunities by promoting interdisciplinary study and research in areas such as occupational safety and health, environmental health, and injury prevention.

Some of these organizations carry public health issues beyond the boundaries of the school. For example, the Center for Health Communication reaches out to the public by using a media-based, consumer-oriented approach to provide reliable health information. The Office of Continuing Education serves the professional community by presenting in its short courses the latest information in the fields of medical sciences and management, occupational health, nuclear safety and radiation protection, environmental management, and control of indoor environments.

The centers and offices are described in the following pages.

■ CENTER FOR HEALTH COMMUNICATION

Jay A. Winsten, AB, PhD, Assistant Dean for Public and Community Affairs and Director of the Center for Health Communication

Working through the mass media, the Center for Health Communication tests new strategies for disseminating health information and promoting the adoption of healthy behaviors in such areas as nutrition, stress, physical fitness, drinking and driving, drug abuse, teen suicide, teen pregnancy, and smoking.

A major focus of the center is to address issues of lifestyle that have a significant effect on health, and to capitalize on the capacity of mass media to reach tens of millions of people and to influence their health attitudes and behavior.

The center has four distinct missions:

- To serve as a source of reliable health information for writers, editors, and producers
- To investigate and evaluate the role of mass communication in public health

- To provide educational and research opportunities for journalists
- To develop a graduate-level curriculum in mass communication for health professionals

The center sponsors the Harvard Journalism Fellowship for Advanced Studies in Public Health to provide opportunities for journalists to examine critical issues in public health through a combination of structured, problem-oriented seminars and self-directed study; and the Health Policy Forum, a colloquium series for the greater Boston health, business, government, and journalism communities.

The center's advisory board is chaired by former United States Surgeon General Julius Richmond, now Professor of Health Policy, Emeritus, Harvard School of Public Health. Other members of the advisory board are John Chancellor, NBC News senior commentator; Arnold Relman, editor of *The New England Journal of Medicine*; Norman Cousins, Adjunct Professor, UCLA; Frank Stanton, former president of CBS, Inc.; William J. Curran, Francis G. Lee Professor of Legal Medicine, Harvard School of Public Health; Joann Rodgers, past president of the National Association of Science Writers, deputy director of the Office of Public Affairs for the Johns Hopkins Medical Institutions, and vice president of the Council for the Advancement of Science Writing; David Perlman, associate editor of the *San Francisco Chronicle* and board member of the Council for the Advancement of Science Writing; Mrs. Irene Pollin; Howard Simons, director of the Nieman Foundation, Harvard University, and former managing editor of *The Washington Post*; Howard Hiatt, Professor of Medicine, Harvard Medical School and Harvard School of Public Health; and O. Milton Gossett, chairman of Saatchi and Saatchi Advertising Worldwide, Inc.

■ EDUCATIONAL RESOURCE CENTER FOR OCCUPATIONAL SAFETY AND HEALTH

Richard R. Monson, SB, MD, SM in Hyg., SD in Hyg., Professor of Epidemiology and Director of the Educational Resource Center for Occupational Safety and Health

The primary objective of the Educational Resource Center is to train occupational safety and health professionals to recognize and prevent occupational injuries and disease. This training effort is directed toward the development of public health perspectives, the acquisition of skills and knowledge for prevention, and the creation of a sensitivity about the political climate in which professionals must act. Through the center's programs, teams of professionals learn to identify and prevent occupational impairments, disease, and injuries through the control or elimination of harmful occupational exposures.

Since occupational health relies on a number of disciplines to provide the elements of prevention and problem solution, the training is multidisciplinary in nature. Descriptions of the full-time academic programs at the master's and doctoral levels are included with the departmental description of Environmental Science and Physiology. Employment opportunities exist in universities, governmental agencies, industry, labor unions, hospitals, and clinics.

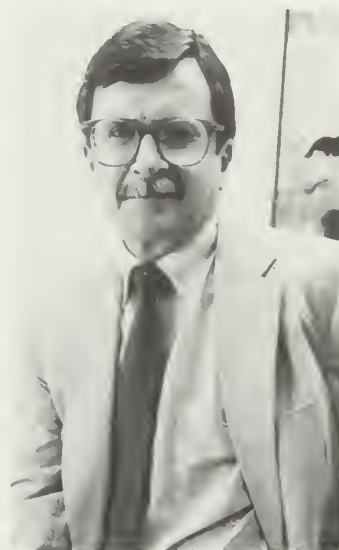
The center is partially supported by a grant from the National Institute for Occupational Safety and Health (NIOSH). Traineeship awards consisting of tuition, stipend, and health fee may be available on a competitive basis to qualified individuals undertaking approved training programs in occupational medicine, industrial hygiene and occupational safety, and occupational health nursing.

Decisions regarding funding are made independently from the application process. All United States citizens, noncitizen nationals of the United States, and permanent residents are automatically considered for funding.

Other facets of the center include a substantial sponsored research program spanning a variety of occupational health problems and drawing upon the expertise of scientists in many disciplines. The center offers midcareer training through short-term courses, seminars, and workshops for physicians, nurses, industrial hygienists, safety engineers, and other occupational safety and health professionals, paraprofessionals, and technicians. The center also has an outreach program which networks

with academic institutions, agencies, professional societies, public health departments, unions, companies, and community associations within the New England region.

For further information about any aspect of the center, including student financial aid, sample curricula, and faculty research interests, contact Mr. Daryl Bichel at the Harvard School of Public Health, 665 Huntington Avenue, Boston, MA 02115 (telephone 617-732-1260).



Dr. Richard Monson, Professor of Epidemiology and Director of the Educational Resource Center for Occupational Safety and Health.

■ KRESGE CENTER FOR ENVIRONMENTAL HEALTH

John B. Little, AB, MD, James Stevens Simmons Professor of Radiobiology and Director of the Kresge Center for Environmental Health

The Kresge Center serves as a focal point for environmental health-related research and training activities in the Harvard School of Public Health. It includes programs within departments such as Cancer Biology, Environmental Science and Physiology, and Epidemiology. Full-time faculty within the center include physicians, engineers, physiologists, mathematicians, toxicologists, chemists, and physicists. This diversity enables the staff to deal effectively with environmental and occupational health problems which require a multidisciplinary approach.

The center conducts research and training in the following areas: occupational health and safety, air pollution health effects and control, biochemical toxicology, radiation biology, radiological health (radiation protection), respiratory biology (inhalation toxicology), and environmental health engineering and management. Students interested in pursuing degree programs in these areas enroll in the relevant department of the Harvard School of Public Health. Students whose primary interest is in problems of hazardous waste, water quality, and water resources may apply to degree programs in Environmental Health Management or to the Division of Applied Sciences of the Graduate School of Arts and Sciences.

■ INJURY PREVENTION CENTER

Bernard Guyer, BA, MD, MPH, Associate Professor of Maternal and Child Health and Director of the Injury Prevention Center

The Injury Prevention Center was established at the Harvard School of Public Health as a multidisciplinary program for the reduction of death and disability due to injury, a problem that has received inadequate attention from researchers and practitioners in public health. The center's activities include research, education, policy development, and consultation with individuals, corporations, nonprofit organizations, and health and regulatory agencies. Faculty of the center are drawn from the Departments of Maternal and Child Health, Health Policy and Management, and Epidemiology, as well as from the Medical School, the John F. Kennedy School of Government, and the Graduate School of Education. Among the faculty and staff involved in the

center are John D. Graham, Associate Professor; David Hemenway, Lecturer; Susan S. Gallagher, Research Associate; and Ilana Lescohier, Project Director.

The center's major programs include the Childhood Injury Prevention Resource Center and the New England Injury Prevention Research Center. The latter is a collaborative effort with Boston University, Tufts University, the Massachusetts Department of Public Health, and the Educational Development Center, Inc. Present research addresses several themes: motor vehicle safety policy, including issues of drinking and driving and passenger restraints; unintentional injuries to children and youth, including pedestrian, home, sports, and recreational injuries; and violence and self-inflicted injuries, including interpersonal violence, the development of aggressive behavior, and suicide. The center provides consultation on research design, program development and evaluation, data systems and surveillance, prevention strategies, and related aspects of injury control.

Faculty associated with the center offer two courses on injury control and participate in other courses offered at the school. A monthly seminar series and a working paper series provide opportunities to share work in progress with professional colleagues. Students from several departments in the school participate in the center's programs.

■ OFFICE OF CONTINUING EDUCATION

Dade W. Moeller, SB, SM, PhD, AM (hon.), Professor of Engineering in Environmental Health and Associate Dean for Continuing Education

Since 1982, the Office of Continuing Education has sponsored educational opportunities for midcareer professionals in health-related fields and industry. The program provides public health professionals the opportunity to keep abreast of new developments and enables them to apply, immediately, new knowledge in their work. During the 1988-89 academic year, the office will coordinate the presentation of approximately thirty short courses, ranging in length from two days to two weeks, and including subjects in medical sciences and management, nuclear safety and radiation protection, occupational health and safety, and environmental management.

Course lectures are presented by faculty members of the School of Public Health, sup-

plemented by recognized leaders working in the field. Selected courses incorporate the case method of instruction; others include laboratory sessions and demonstrations through which participants can gain hands-on experience in the use of standard field equipment. Course participants are encouraged to share their own experiences with other participants and the faculty, creating a dynamic learning environment.

The programs of the Office of Continuing Education draw participants on an international scale, attracting physicians, health care personnel, scientists, and engineers from all over the world. Most participants are employed by public health and regulatory agencies, industrial organizations, legislative committees, research and development laboratories, public utilities, and consultant groups. Over 1400 professional personnel attended these programs during the 1987-88 academic year.

Developed as an outgrowth of the Executive Programs in Health Policy and Management and the Program of Continuing Education in Environmental Health, the creation of the Office of Continuing Education demonstrates the firm commitment of the Harvard School of Public Health to professional education in public health and health management.

Certification maintenance credits for these courses have been awarded by appropriate industrial and medical boards.

Listed below are the courses scheduled for presentation during the 1988-89 academic year:

OCCUPATIONAL HEALTH

Fundamentals of Industrial Hygiene

June 13-17, 1988

October 31-November 4, 1988

Spring 1989 (dates to be announced)

Certification of Biological Safety Cabinets

July 18-23, 1988

Drugs and Alcohol in the Workplace

July 27-28, 1988

AIDS and Infectious Disease in the Workplace

July 28-29, 1988

Respiratory Protection and Chemical Protective Clothing

August 15-19, 1988

Industrial Ergonomics

September 26-30, 1988

New England Occupational Medical Association: Annual Conference

Winter 1988 (dates to be announced)

ENVIRONMENTAL MANAGEMENT

Risk Analysis in Environmental and Occupational Health

August 30-September 1, 1988

Indoor Air Quality

September 7-9, 1988

Environmental Compliance Documentation in Project Planning and Management

December, 1988 (dates to be announced)

Radon in Buildings: Sources, Biological Effects, Monitoring, and Control

December 19-20, 1988

NUCLEAR SAFETY AND RADIATION PROTECTION

Ionizing Radiation: Risks, Biological Effects, and Policy Implications

June 1-3, 1988

Planning for Nuclear Emergencies

June 13-17, 1988

June, 1989 (dates to be announced)

Environmental Radiation Surveillance

June 20-24, 1988

Advanced Workshop on Nuclear Emergency Planning

July 11-15, 1988

Occupational and Environmental Radiation Protection

August 15-19, 1988

March 27-31, 1989

In-Place Filter Testing Workshop

August 29-September 2, 1988

Spring 1989 (dates to be announced)

Radiation Fundamentals for Lawyers

November 30-December 2, 1988

Control of Occupational Exposures in Nuclear Facilities

Spring 1989 (dates to be announced)

Advanced Workshop on Occupational and Environmental Radiation Protection

Summer 1989 (dates to be announced)

MEDICAL SCIENCES AND MANAGEMENT

Clinical Decision Making

June 20-23, 1988

Biotechnology in Public Health

July 18-20, 1988

Managing Physicians

October 3-7, 1988

Program for Advanced Training in Biomedical Research Management

October 16-28, 1988

Program for Chiefs of Clinical Services

January 15-27, 1989

Program for Health Systems Management

February 27-March 10, 1989

Physicians in Administrative Positions

1989 (dates to be announced)

For more information Please write or call the Office of Continuing Education, Harvard School of Public Health, 677 Huntington Avenue, Room L-23, Boston, MA 02115 (telephone 617-732-1171).

ADMISSION AND REGISTRATION

■ ADMISSION

APPLICATION FOR ADMISSION

Applicants or potential applicants who have questions about admission requirements, degree programs, or any other aspect of applying to or enrolling in the school should contact Bernita L. Anderson, Director of Professional Development, Harvard School of Public Health, 677 Huntington Avenue, Boston, MA 02115 (telephone 617-732-1036).

Application forms for admission to all degree programs and for special student status can be obtained from the Admissions Office, Harvard School of Public Health, 677 Huntington Avenue, Room G-4J, Boston, MA 02115 (telephone 617-732-1030).

The section *Degree Requirements* and the departmental descriptions in this *Register* discuss some of the requirements for admission to particular degree programs. In addition to meeting these requirements, applicants must satisfy the school's Committee on Admissions and Degrees as to their ability to undertake graduate study. The final decision as to the admissibility of an applicant rests with this committee.

Applicants may apply to one degree program only and must specify the specialty area or areas in which they plan to take the degree. If the applicant desires to take a joint program in two specialty areas, both areas should be specified and requirements for admission to both areas must be satisfied.

Admission of a candidate is for a particular year; if enrollment at that time is not possible, reapplication is necessary and will be considered on the same competitive basis as a new application. Exceptions must be approved by the Committee on Admissions and Degrees.

Application Deadlines Applicants may submit their completed applications and all supporting documentation by *November 1, 1988*. These early applications will be reviewed and acted on in November and December. Additional applications will be accepted through *February 1, 1989*, with action to be taken in February and March. Applications received from February 2 through May 1 will be accepted for consideration for programs that have not been filled in the November and February reviews.



Application, Supporting Documentation, and Application Fee In completing the application, it is important to refer both to this *Register* and to the detailed instructions accompanying the form. Applicants must submit the following application materials by the deadline date:

- A completed application form, application file card, and mailing labels
- Official transcripts of academic records at colleges, graduate schools, and/or professional schools, with certification of degrees conferred
- Letters of recommendation from at least three people who are well acquainted with the applicant's previous academic work and experience
- Scores of the Graduate Record Examination (GRE) or other standardized test, if applicable (see *Standardized Tests*, following)
- Scores of the Test of English as a Foreign Language (TOEFL), if applicable (see *International Students*, following)
- A nonrefundable application fee of \$50 in the form of a check drawn on a bank in the United States, a postal money order, or an international money order payable to the Harvard School of Public Health

Applicants are responsible for assuring that the official transcripts, letters of recommendation,

and test scores are received by the school. All materials submitted become the property of the Harvard School of Public Health.

Tuition Deposit Admitted applicants submit a \$150 tuition deposit when confirming admission. This deposit is credited to the fall term bill and is not refunded if the student fails to register.

Policy of Nondiscrimination The policy of Harvard University is to make decisions concerning applicants, students, faculty, and staff on the basis of the individual's qualifications to contribute to Harvard's educational objectives and institutional needs. The principle of not discriminating against individuals on the basis of race, color, sex, sexual orientation, religion, age, national or ethnic origin, political beliefs, veteran status, or disability unrelated to job or course of study requirements is consistent with the purposes of a university and with the law. Harvard expects that those with whom it deals will comply with all applicable antidiscrimination laws.

Increasing numbers of students with disabilities are enrolling at Harvard and are participating in a wide range of programs and activities. Every effort is made to meet special needs. There are, however, no separate academic programs for either the physically handicapped or for students with learning disabilities; all enrolled students undertake the same program. At the Harvard School of Public Health, the Director of Student Affairs assists students with disabilities in adapting to life at the school.

STANDARDIZED TESTS

Applicants may be required to submit scores from the Graduate Record Examination (GRE) or other standardized test, as follows:

- **Department of Health Policy and Management** All applicants are required to submit scores from the GRE, the Dental Admission Test (DAT), the Graduate Management Admission Test (GMAT), or the Medical College Admission Test (MCAT), as appropriate to the applicant's background. Lawyers may substitute scores of the Law School Admission Test (LSAT) for the master's programs only.
- **Laboratory of Toxicology** All applicants are required to submit scores from the GRE.
- **Division of Biological Sciences** All applicants are required to submit scores from the GRE.

- **Department of Environmental Science and Physiology: Occupational Health Nursing** All applicants to this program are required to submit scores from the GRE.
- Applicants to all other programs who do not have a prior doctoral degree are required to submit scores from the GRE. Applicants who find difficulty in arranging to take the GRE may request to substitute the DAT, GMAT, MCAT, or LSAT as appropriate to the applicant's background. The Admissions Office will ordinarily approve these requests, but may require the GRE for selected applications for which this test is felt to be more informative than other standardized tests.
- Applicants to programs which do not require test scores who have a prior doctoral degree are urged to submit scores from the GRE, DAT, LSAT, or MCAT.

Applicants are advised to take the GRE (or other test, as appropriate) no later than the December test administration date. When test scores are required, the school must receive an official score report from the Educational Testing Service before final action can be taken on an application. Scores may be no more than five years old.

Additional information concerning the standardized test requirement is included in the instructions accompanying the application form.

INTERNATIONAL STUDENTS

Language Proficiency Applicants from countries in which the language of instruction is not English must satisfy the Committee on Admissions and Degrees as to their ability to speak, read, write, and understand the English language. Only students who have shown evidence of academic excellence, who can understand rapid, idiomatic English, and who can speak, write, and read English with a high degree of facility should apply for admission.

Students are advised that they may be required to attend ten or more classes each week and to write papers and frequent short examinations. The school requires that all students maintain a minimum grade point average of 2.70 (B-) for graduation, and some programs have more restrictive standards. No allowance is made for students whose English is not sufficient for these demands; therefore, any deficiency must be made up before admission.

Test of English as a Foreign Language (TOEFL) All students applying from countries

where English is not the language of instruction must submit scores for the TOEFL. The TOEFL score may be no more than two years old.

A TOEFL score of 550 or above is required for admission to a degree program. Applicants from abroad may be admitted to special student status with a TOEFL score of less than 550 (see *Special Students under Admission to Non-degree Status*, below). However, they may be advised to enroll in an English course while they are taking courses at the Harvard School of Public Health.

Applicants are advised to take the test no later than the November test date, since *applications will not be considered without the TOEFL score*. The TOEFL is administered six times a year at centers throughout the world. Information regarding registration, testing locations, and test administration dates may be obtained by writing to TOEFL Services, CN 6151, Princeton, NJ 08541-6601.

Financial Certification If admitted to the school, foreign nationals, whether residing in the United States or not, must provide certification of their financial resources before the immigration form needed to obtain a visa will be issued. International students must have sufficient funds available in United States currency to pay the expenses for the full period of their academic program, and show proof that they are permitted to exchange or export these funds.

In addition to providing this certification, international students wholly supported by personal funds, family funds, or sponsor's funds which are given directly to them are required to deposit certain amounts in the United States. Funds adequate to cover, at the minimum, the first semester's tuition, fees, and living expenses must be deposited in an escrow account in a bank in New York, NY or Boston, MA. It is recommended that funds adequate to cover the second semester's tuition, fees, and living expenses also be deposited in a bank account in the United States. Before the immigration form can be issued, an official letter stating the amount in United States dollars must be sent directly from the bank to the Admissions Office for each account.

An estimate of living expenses in the Boston area is included in the section *Expenses and Financial Aid*. International students should use the applicable estimate when calculating funds required for financial certification.

Academic Credentials The school must receive official transcripts of all academic records presented for admission. These transcripts must bear the institution's official seal, and be placed in a sealed envelope which is signed across the seal by the proper authority. For more information about this requirement, please refer to the instructions accompanying the application form.

Employment International students who hold an MD degree and either an F-1 or J-1 visa under the sponsorship of Harvard University are not permitted to accept any employment for which an MD degree is a prerequisite while in this country. For more information, contact the Harvard University International Office (telephone 617-495-2789).

Hospital Insurance All nonimmigrant students from abroad are required to enroll in the Harvard Blue Cross/Blue Shield student insurance plan. There can be no exception to this requirement. For more information about the plan, please refer to the section *Expenses and Financial Aid*.

ADMISSION TO NONDEGREE STATUS

Certain individuals are permitted, as a courtesy or by application, to study at the school while in nondegree status. The three categories of nondegree student are Harvard faculty and staff, Harvard affiliates, and special students. In each case, enrollment in courses is subject to the availability of space and the permission of the instructor; in courses with limited enrollment, preference is generally given to degree candidates. Payment in each case is not refundable and is due prior to or at the time of registration. Admission to nondegree status carries with it no commitment to accept the student as a degree candidate.

Harvard Faculty and Staff Persons holding Harvard Corporation appointments of at least halftime teaching faculty are permitted to enroll in courses at the school with the permission of the instructor and the registrar. Harvard staff should consult the Personnel Office about the provisions of the Harvard Tuition Assistance Plan. Harvard faculty and staff may take a maximum of five credit units per term.

Harvard Affiliates Full-time employees of an institution affiliated with Harvard, and persons at Harvard University not covered in the preceding paragraph, who hold at least a bachelor's

degree, may apply for affiliate status. Applicants admitted to affiliate status may take no more than five credit units per term and ten credit units in total. Affiliates are not allowed to audit courses. Applications for admission to affiliate status can be obtained only by coming in person to the Admissions Office.

Special Students Procedures and requirements for the admission of special students are the same as for degree candidates, and in general, special student status is governed by the same policies that apply to all matriculated students. (Exception: At the discretion of the Committee on Admissions and Degrees, foreign students applying for degree candidacy may be admitted to special student status if their TOEFL is less than 550. These students may petition the Committee on Admissions and Degrees for reconsideration for degree candidacy upon receipt of a TOEFL of 550 or better.)

Applicants should specify on the application form the courses they plan to take. Special students are not allowed to audit courses. Those enrolled less than full time are not permitted to cross-register into other Harvard schools or MIT. Special student status is limited to one academic year. Special students who wish to be admitted to degree candidacy, other than the exception described in the preceding paragraph, must reapply and will be considered on the same basis as other applicants for admission.

Retroactive Credits Applicants to degree programs who have previously taken courses at the school while in nondegree status may, at the time of their application, petition to count up to ten credit units retroactively as part of the academic credit requirements. These courses must have been taken within three years of the date of entrance into the degree program and cannot be or have been counted toward any other degree at this school or at any other school. Applicants who were cross-registered at the Harvard School of Public Health while enrolled at another Harvard-affiliated school must include with their petition an official transcript from the other school as well as a letter from that school's registrar stating that the courses taken at the School of Public Health have not been counted toward a degree. A request for retroactive degree credit must be approved by the department or program with which the student is affiliated and by the Committee on Admissions and Degrees. Permission may be granted if the courses fit into the applicant's academic program. Tuition credit will not be given for previous course work, and students are expected to meet full tuition requirements for the degree.

■ REGISTRATION

ACADEMIC YEAR

The academic year at the Harvard School of Public Health is divided into two terms, or semesters. The fall term begins in mid-September and the spring term begins in late January. Each term is divided into two periods: "a" and "b" in the fall term, and "c" and "d" in the spring term. Between the terms, in January, a week of field work and special projects is called "e" period. There is a similar period during March recess called "f" period. The Program in Clinical Effectiveness offers its students courses during an eight-week summer period referred to as "s" period. The *Academic Calendar*, which gives term dates, recess periods, holidays, and so forth, is printed in the front of this *Register*.

REGISTRATION PROCEDURES

Every degree candidate is expected to register until the requirements for the degree are fulfilled or until degree candidacy is terminated. Every resident student, whether full time or half time, must register in person at the beginning of each term.

Fall registration is held during the week prior to the first day of classes. Registration dates and deadlines for fall and spring terms are listed in the *Academic Calendar* in the front of this *Register*. Students cross-registering into other schools must meet the deadlines set by *both* the School of Public Health and the school offering the course. A fee of \$35 per week is charged for late registration.

To complete registration, each student must file a study card with the Registrar's Office. Study cards must be submitted in person and may not be submitted by persons other than the student without special permission from the registrar. Students who wish to take courses jointly offered by the School of Public Health and other Harvard schools must register for these courses at the School of Public Health. Students who wish to cross-register for a course offered by another school must obtain a cross-registration petition from the Registrar's Office at the School of Public Health and take it to the registrar's office of the school offering the course.

INTERNATIONAL STUDENTS

All international students must report to the Harvard International Office, 1350 Massachusetts Avenue, Cambridge, MA, at the



Judith Hull (right), Registrar and Director of Admissions, discusses academics with Mary Ann Sprauer, an MPH student in Maternal and Child Health and Class Secretary for the Class of 1988.

beginning of their first term at the school. There they must present their passports and entry permits or other evidence of their immigration status. This requirement applies to all students who hold an F-1 student visa, a J-1 exchange visitor visa, or permanent resident status.

COURSE LOAD REQUIREMENTS

Full-Time Students Students must take a minimum of 40 credit units for the year to be registered as full time. Students normally take 20 credit units per term.

However, a full-time student may take a minimum of 15 units in a term, with a minimum of 5 units in any one period, and may register for a maximum of 25 units per term. To take more than 25 units in a term, a student must submit a petition to the Committee on Admissions and Degrees at the time he or she files the study card. Full-time students who take more than 40 units in a year are not charged additional tuition.

Students in the two-year, 80-unit Master of Science program must take a minimum of 40 units in the first year and 35 units in the second year. Students who take more than 40 units in the first year may carry over only 5 units into the second year. In other words, the 80-unit requirement may be met by taking 45 units the first year and 35 the second year.

Students who are accepted into two consecutive one-year programs (40 credit units each) and who are awarded one degree at the end of the first year must fulfill the requirements for a one-

year (40-unit) program during the second year. Credit units may not be carried over from the first program into the second. Persons in a 60-unit master's degree program must follow the guidelines for students in an 80-unit degree program, except that all 60 units must be taken within three consecutive terms.

Half-Time Students Half-time students generally complete a one-year program in two academic years. A regular program for half-time students consists of 10 credit units per term, although they may register for a minimum of 7.5 and a maximum of 12.5 units per term for a total of 20 units per year. Units over 25 per year are assessed an additional tuition charge of \$290 per unit; tuition paid for units over 25 per year may not be applied toward total tuition requirements (see *Expenses and Financial Aid*). Half-time students wishing to take more than 25 units per year must petition the Committee on Admissions and Degrees for approval, in addition to paying extra tuition for the additional units.

Part-Time Students The Committee on Admissions and Degrees occasionally permits students to register as part-time degree candidates. These students must complete a two-year, 80-unit program in three academic years; ordinarily, this requires at least half-time attendance. Tuition is charged at the full-time rate for the first year and at the half-time rate for the following two years. Students in a two-year program desiring any other credit unit/program arrangements must submit a petition to the Committee on Admissions and Degrees for approval.

EXPENSES AND FINANCIAL AID

■ EXPENSES

TUITION AND FEES

Tuition and fees for the academic year 1988-89 are as follows:

Degree Candidates

Full-time resident tuition	\$11,875*
Half-time resident tuition (up to 25 credit units per year)	6,140*

(Credits over 25 will be charged \$290 per credit.)

Doctoral full-time reduced tuition	6,140*
Doctoral half-time reduced tuition	3,275*
Doctoral facilities fee (resident)	1,850*
Nonresident guidance fee (half-time)	715

Leave of Absence

Active file fee for each term student is on leave	100
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Special Students

Enrolled for 10 or more credit units:
Tuition as stated above for full-time or half-time attendance.

Enrolled for 6 to 9 credit units:	
First credit unit of work per term	505*
Each additional credit unit of work per term	290

Enrolled for 1 to 5 credit units:	
Per credit unit of work per term	290

Summer Session (1989)

Five credit unit summer program for degree candidates who register and receive credit for research or supervised study during summer session	1,440
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Dissertation Fee

Final doctoral tuition fee. For the registration period in which a dissertation is formally approved and accepted by the department and the Committee on Admissions and Degrees, a doctoral degree candidate must have paid at least half of the current facilities fee.	465
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Medical Insurance

Blue Cross/Blue Shield is billed separately. This is compulsory for nonimmigrant foreign students.	492
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Late Fees

Late registration fee	35
Late study card fee	35/week

Drop/Add Fee

Within published deadlines: per drop/add petition	10
After published deadlines: per CAD petition	35

* Starred amounts include the **unwaivable** University Health Services fee.

FINANCIAL CLEARANCE

Degree Candidates The filing of a study card is necessary to complete registration. The Registrar's Office will not officially register a student who is not financially clear. To be considered financially clear, students must pay all past charges due the university and must take one of the following actions toward payment of the current term's tuition and fees:

- Pay the current term's charges in full.
- Enroll in the monthly payment plan. This allows students to pay one-quarter of the term's charges at the time of registration and to spread the rest of the payments over the next three months. Students can sign up for the plan at the Student Billing Office, Holyoke Center fifth floor, Cambridge. The fee for this service is \$25 per term.
- Obtain documentation from the school's Financial Aid Office that loans are in process which will cover the term's full tuition and fees. Students with loans pending are allowed to register conditionally until the loan acceptances are available for signature.
- Provide documentation that tuition and fees are being directly billed to and will be paid by a sponsoring organization.

Any student whose indebtedness to the university remains unpaid on the date fixed for payment may be deprived of the privileges of the university. Reinstatement is obtained only by consent of the dean of the school in which the student is enrolled.

Nondegree Students Harvard faculty and staff, Harvard affiliates, and special students enrolled for less than 10 credits must pay all tuition and fees for the term in full when they register. Payment is not refundable.

Billing Address Term bills are sent to a student's local address unless the Student Billing Office is requested in writing to send them elsewhere.

TUITION REQUIREMENTS

After admission to the Harvard School of Public Health (HSPH) and until fulfillment of the requirements for the degree, all degree candidates must be registered continuously in one of the following registration categories:

- Resident students
- Nonresident doctoral students
- Students on leave of absence

Degree candidates must pay full tuition for a designated number of years, depending on their degree program and their previous affiliation with the school. All degree candidates must pay the appropriate tuition rate for each registration period as outlined on the *Tuition and Fees* schedule; tuition may not be paid on a “per credit” basis, except for half-time degree candidates who take over 25 credit units for the year. Any degree candidate who registers for less than full time must in any event fulfill the full-time, full-tuition requirements for the degree. Tuition for summer school courses and additional tuition paid by half-time degree candidates for credits over 25 per year may not be credited toward any tuition requirements for the degree.

Resident Students All degree candidates who are enrolled in courses or who intend to use any Harvard academic facilities must register as resident students. *Master’s degree students* pay full tuition for the entire period in which they are in full-time attendance.

The tuition requirements for resident *doctoral students* are as follows:

1. Students who have received a one-year master’s degree from HSPH within three years of enrolling in a doctoral program in the same discipline pay a minimum of one year of full tuition and one year of reduced doctoral tuition.
2. Students who have received a two-year master’s degree from HSPH within three years of enrolling in a doctoral program in the same discipline pay a minimum of one year of reduced doctoral tuition.
3. Students who have received a Master of Public Health degree and a Master of Science degree from HSPH within three years of enrolling in a doctoral program in the same discipline as one of their HSPH master’s degrees pay a minimum of one year of reduced doctoral tuition.
4. Students who have not previously attended HSPH pay a minimum of two years of full tuition and one year of reduced doctoral tuition.
5. In the year(s) following the year in which reduced doctoral tuition is paid, students pay only the facilities fee. This fee enables students to use Harvard academic facilities and the University Health Services.

Nonresident Doctoral Students Doctoral students who no longer reside within a 50-mile radius of Boston, who are engaged in less than half-time work on the degree, and who have received permission from their department and the Committee on Admissions and Degrees (CAD) to pursue a portion of their program as a nonresident, are charged the nonresident guidance fee. Students in this category normally have completed payment of at least the required two years of full-time tuition and one year of reduced doctoral tuition before applying for nonresident status; they must in any case complete this payment prior to their graduation and will be billed accordingly while in nonresident status.

The nonresident guidance fee covers periodic consultation with the student’s doctoral adviser but does not provide for the use of Harvard facilities or for the issuance of a Harvard identification card. Also, students registered for less than a half-time program may not qualify for deferment of an educational loan. Upon expiration (or earlier termination) of CAD permission for nonresident status, or for a term in which use of Harvard facilities is required, the appropriate resident rate will be charged.

Students on Leave of Absence Degree candidates who will not, during a given registration period, be engaged in study or research for a degree from the school, and who will be making no use of Harvard facilities, must apply for a leave of absence. The application should be made prior to the registration period for the term during which the leave of absence would begin. Students on leave of absence are required to pay the active file fee to maintain their degree candidacy. Upon expiration or earlier termination of the leave of absence, students are charged the appropriate tuition rate.

STUDENT HEALTH INSURANCE

University Health Services University Health Services (UHS) provides comprehensive prepaid medical care such as physical examinations, physician visits, laboratory tests, and psychological counseling. Students may establish a relationship with a particular UHS physician and may use the drop-in clinic for acute medical and surgical situations. Payment of the University Health Services fee is compulsory for all students enrolled for at least 6 credit units per term.

Blue Cross/Blue Shield The Blue Cross/Blue Shield (BC/BS) medical insurance plan, charged



Laura Till (center), Director of Financial Aid, explores funding options with students Stephen Tollman and Linda Tsung.

separately from the University Health Services fee, covers the costs of many types of medical care not offered at University Health Services. Students may enroll in the plan in September or January, and coverage extends through August 31. A descriptive brochure about the BC/BS plan is included with the fall registration materials.

Students are automatically enrolled in the BC/BS plan. This insurance is compulsory for all nonimmigrant students from abroad. It is also required for all other students who do not have comparable insurance.

United States students who have comparable medical insurance and who would prefer not to enroll in BC/BS must submit a waiver form by August 19 (for the fall term) or January 20 (for the spring term). *Students who fail to file waivers will be responsible for any fees billed for that term.* Waivers for BC/BS insurance are approved *only* by the Director of the University Health Services.

Nonresident doctoral students are not automatically enrolled in any Harvard health plan. Those

who wish to have BC/BS insurance coverage must file special forms with the Harvard Student Insurance Office by August 19 (for the fall term) or January 20 (for the spring term). Coverage is optional for students who are residing outside the United States. However, BC/BS insurance is mandatory for all international students in nonresident status *within* the United States.

A BC/BS plan for spouses (including maternity benefits) and children of full-time students is also available. As the plan provides extensive benefits for ambulatory and inpatient care, all who are eligible are strongly advised to enroll.

FIELD STUDIES

Field opportunities, listed under each department's course offerings and bearing the course number 330, often entail travel expenses that must be met by the student. Information about estimated expenses should be obtained from the appropriate department.

LIVING EXPENSES

Living costs in the Boston area are higher than in many other parts of the United States. The table below lists estimated amounts that stu-

dents will need in the academic year 1988-89 to cover expenses for nine months. Applicants who plan to enroll in a two-year program should allow for a four to six percent increase for the academic year 1989-90.

Harvard School of Public Health
Estimated Expenses for the 1988-89 Academic Year
 (calculated for 9 months)

	<u>Single</u>	<u>Married</u>	<u>Married/ 1 child</u>	<u>Married/ 2 children</u>
Living Expenses				
Rent/Utilities ¹	\$ 5,026	\$ 6,107	Increase	Increase
Food	1,128	2,255	by	by
Personal ²	2,349	5,220	\$3,650	\$3,000
Transportation ³	507	846		
	<u>\$ 9,010</u>	<u>\$14,428</u>	<u>\$18,078</u>	<u>\$21,078</u>
Educational Expenses				
Books/Supplies	675	675	675	675
Student Health Insurance ⁴	492	492	492	492
Tuition (full-time)	11,875	11,875	11,875	11,875
	<u>\$13,042</u>	<u>\$13,042</u>	<u>\$13,042</u>	<u>\$13,042</u>
Total Expenses	\$22,052	\$27,470	\$31,120	\$34,120

Notes:

Applicants should keep in mind that these figures are only estimates and cannot reflect individual life styles. International students should increase expenses by about 10% to account for possible decreases in currency exchange rates.

¹Rents in the Boston area may be substantially higher than where an applicant is coming from. Because of the influx of students, apartments can be difficult and expensive to find for September. It is standard practice to have to pay first and last month's rent plus a security deposit to secure housing.

²Students from warmer climates should consider the added expense of winter clothing (about \$350 per person). The purchase of minimal furniture and household items to set up an apartment may also have to be added to these expenses.

³Transportation is generally considered the cost of using public transportation and may exclude relocation costs, car expenses, and travel home for vacation.

⁴Family health insurance is also available for about \$1,500 for the academic year. Additional information on the health insurance plans is available during registration.

■ FINANCIAL AID

SOURCES OF FINANCIAL AID

Financial aid at the Harvard School of Public Health is generally available only to United States citizens and permanent residents, since most of the funding is from federal sources. United States citizens and permanent residents are eligible to apply for grants, loans, and work-study programs.

Grants for United States Citizens and Permanent Residents Some departments have training grants that may provide up to full tuition and a stipend. Eligibility for these grants is based on career goals, merit, and/or financial need. Applicants should contact the administrator of the department to which they seek admission for further information on available departmental grants.

Students who do not receive grant support from a department and who have demonstrated financial need may be eligible for school grants administered by the Financial Aid Office. In the past, these general school funds have been available to provide a limited number of grants ranging from half of tuition to full tuition. Several full-tuition grants are reserved for incoming minority students.

Grants for International Students Very little funding is available for international students. Most financial aid available throughout the school comes from the United States federal government and is restricted to citizens and permanent residents of the United States. A small amount of grant aid may be available for incoming international students, who must be nominated by their department for consideration by the Financial Aid Office. If nominated, international students are asked to provide verification of their need for financial assistance. Students should contact their department chairman for information and submit the Application for Financial Assistance.

College Work-Study Program College Work-Study is a federally funded program which provides eligible students with financial support to facilitate obtaining employment in public and private organizations. Students are given earnings allocations; 70% of the earnings are paid by Work-Study and 30% are paid by the employer. Eligibility is based on financial need, full-time status, and availability of funds.

Scholarships Throughout the year, various scholarships may become available through university and outside sources. Some examples are scholarships for Massachusetts, Rhode Island, and Delaware residents; the Pforzheimer Fellowship for graduates of Harvard/Radcliffe College with interests in public service; and the Kennedy, Knox, and Sheldon Traveling Fellowships. Students should contact the Financial Aid Office for additional information.

Loans Loans have increasingly become a major source of support for Harvard School of Public Health students. United States citizens and permanent residents may apply for the following loans:

■ **Guaranteed Student Loan (GSL)**

Interest rate: currently 8%; for new borrowers only, interest rate will increase from 8% to 10% after fourth year of repayment; previous borrowers may have 7% or 9%

Subsidized interest: yes, by federal government while student enrolled at least half-time and

during grace periods (6 to 9 months) after graduation, or if less than half-time

Fees: 5% origination fee; insurance fee varies with guarantee state

Annual limit: \$7,500

Aggregate maximum: \$54,750

Eligibility: Congressional methodology need analysis

Source: Harvard University or outside lender

■ **Supplemental Loans for Students (SLS)/PLUS**

Interest rate: currently 10% but interest is variable with cap of 12%; previous PLUS borrowers may refinance at variable rate

Subsidized interest: no, student may make monthly interest payments or have interest capitalized

Fees: about 2%

Annual limit: \$4,000

Aggregate maximum: \$20,000 (includes PLUS loans)

Eligibility: credit worthiness

Source: Harvard University or outside lender

■ **Perkins Loan (formerly NDSL)**

Interest rate: 5%

Subsidized interest: yes, see GSL

Fees: none

Annual limit: determined by Financial Aid Office; probably up to \$5,000

Aggregate maximum: \$18,000

Eligibility: see GSL; preference given to the neediest students with previous loan debts

Source: Harvard University

■ **Health Education Assistance Loan (HEAL)**

Interest rate: variable, but is currently about 9%

Subsidized interest: no

Fees: about 7%

Annual limit: \$12,500

Aggregate maximum: \$50,000

Eligibility: see GSL

Source: outside lenders, but applications available through Financial Aid Office

■ **SHARE Loan/GRAD SHARE Loan**

Interest rate: variable or fixed

Subsidized interest: no

Fees: about 4%

Annual limit: \$15,000 (\$2,000 minimum)
SHARE; \$7,500 GRAD SHARE

Aggregate maximum: \$60,000

Eligibility: credit worthiness

Source: Nellie Mae (1-800-EDU-LOAN)

The School of Public Health has no established limits on aggregate loan debt, separate from program limits. Students are advised to consider several factors when accumulating loan debt:

- Anticipated salary upon graduation
- Effects of loan debt on future eligibility for credit
- Seriousness of loan defaults
- Future financial goals

APPLYING FOR FINANCIAL AID

Candidates applying to departments with training grants should consult with the departments on procedures for applying for these grants. Candidates who would like to be considered for general school funds, as well as anyone interested in applying for loans or for College Work-Study, must submit the following materials to the Financial Aid Office, Harvard School of Public Health, Room G-4H, 677 Huntington Avenue, Boston, MA 02115 (telephone 617-732-1867):

- HSPH Application for Financial Assistance for 1989-90
- Completed and processed Graduate and Professional School Financial Aid Service form (GAPSFAS) for 1989-90 (available on request from the Financial Aid Office)
- A copy of 1988 federal income tax return
- A copy of alien registration card for permanent residents

Deadlines There are two deadlines for applying for general school grants. Candidates who have been accepted for admission and whose financial aid application materials are complete by *February 1, 1989* will be informed of grant awards soon after February 15. Candidates who have been accepted for admission and whose financial aid application materials are complete between February 2 and *March 15, 1989* will be notified of grant awards soon after April 1.

Financial aid applications will be accepted after March 15, but there can be no guarantee of availability of grants. **Since grant funds are very limited, candidates are urged to apply for financial aid as early as possible and should not wait until they are accepted to the school.**

POLICIES

Contingencies Retention of awards and loans is contingent upon making satisfactory academic progress (the maintenance of at least the minimal acceptable grade point average and the required number of credit units).

Defaults Applicants should be aware that the Harvard School of Public Health views the issue of defaulted education loans as a very serious matter. According to federal regulations, students in default are ineligible to borrow through any federal education loan program or to participate in the College Work-Study Program. Students are also ineligible to receive any institutional support from the Harvard School of Public Health.

Policy of Nondiscrimination The policy of nondiscrimination described under *Admission* holds for financial aid decisions as well.



Associate Dean for Students, Dr. R. Heather Palmer, addresses students at fall orientation.

COURSES OF INSTRUCTION

In the course listings, course numbers from 100 to 199 indicate undergraduate and graduate courses; numbers from 200 to 299 indicate primarily graduate courses; and numbers from 300 to 399 indicate graduate courses of reading and research.

The letters "a," "b," "c," "d," "e," "f," and "s" following the course number indicate the period(s) in which a course is given, with "a" denoting first period and "b," second period (fall); "c," third period and "d," fourth period (spring). The letters "e" and "f" indicate supervised special studies or field observations, usually during the one-week period between fall and spring terms or during the week of spring recess. The letter "s" indicates courses offered in the summer as a part of the Program in Clinical Effectiveness.

The credit assignment is given in units following the statement of number and length of sessions per week. Credit units are assigned on the basis of the total amount of time required by a course, both class time and outside preparation.

Course titles in bold type are often followed by titles and numbers in roman face (enclosed in parentheses). This indicates that the course is also listed in other Harvard catalogs, such as Arts and Sciences, and that the course credit is provided through that faculty as well as through the School of Public Health, e.g., POP 209ab (Biology 195).

Every effort is made to ensure that the following list of courses is complete and accurate at the time of publication. However, the school reserves the right to make changes in the courses, instructors, and requirements announced in this *Register*.

The listing of courses in this *Register* implies no guarantee that a student will in fact be able to enroll in all courses of interest to that student. The course schedule is arranged insofar as possible to accommodate school and departmental requirements. However, students may encounter scheduling conflicts, particularly with electives and with courses offered in other faculties. Students should also be aware that they must satisfy any prerequisites listed in a course description before they will be permitted to enroll in that course. Courses may be dropped from the schedule at the discretion of the instructor if less than five students enroll.

■ INTERDEPARTMENTAL COURSES

ID 201ab. Biology, Epidemiology, Economics, and Policy (BEEP): Malaria Lectures, seminars. *One 3-hour session each week. 5 units.* Dr. David.

This course is designed to bring a multidisciplinary approach to a major public health problem in international health. Within the context of the biology and epidemiology of malaria, students are exposed to strategies of vector control, chemotherapy, and vaccines from the point of view of social, political, and economic policy. Impacts of programs are evaluated from an international local perspective utilizing techniques from both the social and biomedical sciences.

ID 205ab/205cd. Interdepartmental Seminar in the Biological Sciences Lectures, discussions. *One 3-hour session in alternate weeks. 2.5 units per term.* Dr. Cairns, Dr. Mullins, Members of the Division of Biological Sciences.

HSPH faculty present seminars on their current research in the biological sciences and help direct a student discussion of the logic and experimental design of this research. Topics include chemical and viral carcinogenesis, DNA damage and repair, immunology, molecular biology, radiobiology, respiratory biology, and virology. In the "ab" period, the course runs in alternate weeks opposite ID 207ab.

Required for first-year students in Cancer Biology and in the Division of Biological Sciences.

ID 207ab. Papers in the Biological Sciences: Past and Present

Discussions. *One 3-hour meeting in alternate weeks. 2.5 units.* Dr. Samson, Dr. Cairns, Dr. Mullins.

Students and faculty discuss "classic" papers in biology from the perspective of their logic and experimental design rather than their factual content. The course is intended to provoke in-depth discussion and assessment of biochemical, physical, and genetic methods employed in testing hypotheses. The course runs in alternate weeks opposite ID 205ab.

Required for first-year students in the Division of Biological Sciences.

Prereq. Permission of the instructor.

ID 208d. Transformation of the Health Sector in South Africa: Obstacles and Possibilities

Lectures. *One 2-hour session each week. 1.25 units.* Dr. Cash.

Examines the health sector in South Africa in terms of the prevailing sociopolitical

environment, including the government's plans to privatize large parts of the racially based health service and the call of the academic and popular communities for a national health service. By focussing on key topics, students develop an understanding of the obstacles that face a reorientation of the health sector toward a nonracial and democratic society, and generate ideas on desirable, appropriate, and feasible possibilities for such an orientation.

ID 209a. Health Services in Developing Countries

Seminars. *Two 2-hour sessions each week. 2.5 units.* Dr. Cash, Guest Lecturers. Provides a broad overview of health and health care problems in developing countries. Central issues include ecologic, environmental, and other characteristics of developing countries affecting health: analysis of their health problems, the alternative approaches to solving them, the policy and planning issues in applying solutions, and the organizational alternatives for utilizing health resources; the nature, composition, and training of the health team for use at the local and district levels; and the relation of health to development and the position of health in national planning priorities. Case studies are used extensively with student teams proposing solutions to the problems.

Preference is given to students who have previously been involved in international health activities.

ID 210c, ID 210d. Introduction to Educational Design in Health Fields

Seminars. *Two 2-hour sessions each week. 2.5 units.* Dr. Vanderschmidt, Dr. Koch-Weser, Dr. Segall.

An introductory course designed for students preparing for careers in the education of health professionals. Provides a systematic approach to instructional design through a model program which includes analysis of professional responsibilities and performance, specification of educational objectives, design of instructional activities, and evaluation of the educational process and outcome. Students apply the model to the development of a segment of instruction in areas of individual interest. Examples are drawn primarily from the fields of public health and community-oriented primary care. During the "c" period, students may elect to take the course on a self-instructional basis by agreement of the instructors. The course is repeated during the "d" period on a self-instructional basis only.

ID 211c. Vaccines: Past, Present, and Future

Lectures, discussions. *Two 2-hour sessions each week. 2.5 units.* Dr. Essex, Dr. Walsh. Covers methodology for new vaccine development, human trials, manufacturing and quality control, techniques to ensure appropriate use of vaccines, liability issues, cost-effectiveness analysis, and decision analysis regarding vaccines for future research, development, and distribution.

ID 212c. Biomedical Writing

Seminars. *One 2-hour session each week. 2 units.* Dr. Chernin.

Writing scientific papers is an integral part of the research process. This course develops practical skills and experience in planning and writing articles that meet the editorial demands of biomedical journals. The salient elements of a well-prepared article — logical organization, clear and concise scientific prose, and understandable tables and figures — are emphasized by criticizing short papers written by the participants on biomedical subjects of their own choice.

Enrollment limited to 10 students and requires approval of the instructor at least two weeks before the quarter begins. This course is given pass/fail.

ID 214c. Cultural Dimensions of International Health: Practical Applications for Health Planning

Lectures, case studies. *One 3-hour session and one 1-hour session each week. 2.5 units.* Dr. Weiss.

Introduces students to the important and complex effects of culture on health and health care. Develops a systematic method to guide planners in designing culturally informed health services. Considers how the local and larger cultural contexts mediate the effects of power relationships and political and economic forces that affect health and health care.

ID 216d. Health Aspects of Nuclear War (HMSC-PMCE 709)

Lectures. *One 2-hour session each week. 2.5 units.* Dr. Leaf, Dr. Forrow, Dr. McArdlc, and other medical area faculty. Introduces students to the medical dimension of thermonuclear weapons and war. Topics center about the medical consequences of nuclear weaponry and war. Background material includes brief surveys of the physics of weaponry, modern weapon delivery systems, and biological and ecological effects of radiation. The acute and long-term medical needs, available facilities, and medical and psychosocial problems of survivors are discussed. Students participate in discussions; each student leads a classroom presentation and discussion.

ID 217cd. Capitalism, Socialism, and Public Health

Not given 1988-89; offered alternate years. Lectures, seminars. *One 2-hour session each week. 2.5 units.* Dr. Lewontin, Dr. Levins, Visiting Lecturers.

Contrasts the analysis of problems in public health, nutrition, and population by Marxist and capitalistic social and economic theories. Topics include Marxist economics and social theory, population control, "green revolution," nutrition planning, maternal and child health, and occupational health.

ID 220ed. Workshop: The Design and Management of Development Programs and Projects (KSG S-562)

Seminar. *Two 1½-hour sessions each week. 5 units.* Dr. Thomas.

Draws heavily on students' own experience and working knowledge of analytical techniques. Attempts to synthesize practical and educational experience to provide the student with a stronger set of skills for future participation in development programs. Emphasizes both the analysis of issues from a political economy perspective and the practical skills of group work, negotiation, memo writing, and verbal presentation in simulated practical situations. Students are expected to have prior experience in and career commitment to the field of development.

Enrollment subject to approval of the instructor.

ID 222d. The AIDS Epidemic: Status, Dynamics, Prospects, Conflicts

Lectures, discussions. *One 2-hour session each week. 1.25 units.* Dr. Essex.

Deals with a broad range of topics relating to the public health implications of the AIDS epidemic, including the virology, therapy, and etiologic hypotheses concerning the origins of the virus. Topics for discussion and review include the dynamics of the epidemic, public policy issues relevant to measures to reduce the spread of infection, economic implications, and social support needs of affected persons. Prereq. MD degree or demonstrated knowledge of virology, molecular biology, or animal biology, or permission of the instructor.

ID 230b. Health of Community Populations

Lectures, discussions. *Two 2-hour sessions each week. 2.5 units.* Dr. Gortmaker, Dr. Wise, Guest Lecturers.

Principally targeted for those with interests in biostatistics, epidemiology, health policy, and management. Focuses on the common diseases particularly affecting persons living in poverty or near poverty conditions in urban America. Discusses the impact of socioeconomic, cultural, and environmental factors upon ill health. Provides an overview of the types of data available from which to identify community health problems. Presents and evaluates case studies from local communities.

Prereq. BIO 200ab or BIO 201ab.

ID 232cd. Change Strategies at the Community Level

Lectures, discussions. *One 2-hour session each week. 2.5 units.* Dr. Brown.

Assists students in analyzing and understanding functional aspects of communities, and in understanding the role of various institutions with respect to health, illness, and the quality of life in communities. Analyzes variables which contribute to success or failure in altering health conditions, and the roles health professionals play in altering the health status of populations.

Prereq. Present or past clinical/field experience.

ID 330f. Field Trip

Three-day period between "c" and "d" periods. 1 unit. Dr. Greaves.

Centers for Disease Control, Atlanta, Georgia.

The Centers for Disease Control (CDC) is a unique institution with many public health functions relevant to the educational and research interests of domestic and foreign students. This field trip will give students an overview of the activities of the CDC, as well as an opportunity to meet individually with professional staff at CDC. Lectures and tutorials relate to the various disciplines at CDC, including occupational diseases, surveillance systems, epidemiology, control measures for both chronic and infectious diseases, and CDC's role in international health. Other topics are arranged depending on the interests of the group. A brief paper on the material covered is required of each student.

■ BEHAVIORAL SCIENCES**BEH 202b. Health and Behavior**

Lectures, discussions. *Two 2-hour sessions each week. 2.5 units.* Dr. Gortmaker.

Reviews sociodemographic and sociopsychological factors in the initiation, maintenance, and cessation of health-related behaviors. Considers behavior change strategies for primary and secondary prevention of disease from a health policy perspective and focuses on issues of compliance with medical regimens. Course instructor is Dr. Daltroy.

BEH 205cd. Behavioral Sciences in International Perspective

Seminars, lectures. *One 2-hour session each week. 2.5 units.* Dr. Pierce.

Offers a survey of various behavioral sciences theories and practices. The aim is to demonstrate how such information can be modified for application to problems which are common to health problems in human society, regardless of locality. Readings, seminars, lectures, discussions, and written assignments cover three broad areas: health, communication, and cooperation.

MCH-BEH 210ab. An Introduction to Personality and Cognitive Development
Lectures, discussions. *One 2-hour session each week. 2.5 units.* Dr. D. Walker.
Not given 1988-89.
(Course described under Maternal and Child Health.)

BEH 211c. Mass Communications and Public Health

Seminars, case studies, lectures. *One 1½-hour session each week, two full-day trips. 2.5 units.* Dr. Gortmaker.

Covers the theory of communications, creation of radio and TV advertising, research and polling, media buying, contextual uses of media, media and political strategy, public relations, and lobbying. Students spend two weekends in a New York studio, with Dr. Tony Schwartz, producing health-promotion commercials. Lectures in Boston are via teleconference with the studio in New York.

Preference is given to students in the Department of Behavioral Sciences. Class enrollment limited to 20. Application forms must be filed three weeks prior to start of course.

BEH 214d. Behavior/Lifestyle Change and Risk Factor Alteration: Introduction to Methods

Lectures, discussions. *One 3-hour session each week. 2.5 units.* Dr. Gortmaker.
Focuses on the planning, implementation, and evaluation of intervention programs addressing the primary prevention of disease. Examines risk factor reduction and life style changes in promoting health. Course instructor is Dr. Benfari.

BEH 215c. Inducing Social Change

Lectures. *Two 1½-hour sessions each week. 2.5 units.* Dr. Mertens.
Designed for various specialists in public health who are charged with responsibility for introducing changes in organizations and communities. The subject matter includes methods and theories of teaching, principles of individual and group psychotherapy, approaches to sensitivity training and group dynamics, and organizational theory. Techniques and procedures illustrating these theories are presented through readings, discussions, and case illustrations.

BEH 216cd. Case Studies in Health Promotion

Case studies. *One 2-hour session each week. 2.5 units.* Dr. Cleary.
Examines health promotion/education interventions in the US and developing nations. Teaches techniques of intervention design using print and non-print media. Applies basic principles of education and social psychology.

BEH 220cd. The Epidemiology of Pathological Behaviors: Problems, Concepts, and Methods

Seminars. *One 3-hour session each week. 5 units.* Dr. Wechsler.

Surveys the epidemiology of pathological behaviors and social pathologies. Topics include psychiatric disorders, alcoholism and drug addiction, suicide, antisocial behavior, smoking, and anorexia. Provides an historical overview of studies using data from treatment services and institutions as well as field studies of the general population.

BEH 221c. Mental Health Factors in Organizations and Industry

Lectures, readings, case illustrations. *One 2-hour session each week. 2.5 units.* Dr. Mertens.

Covers psychological well-being of entire organizations, interpersonal conflict, psychological causes of industrial accidents, industrial and organizational stress, and the organization of psychological units in industry.

BEH 222c. Alcoholism and Alcohol Abuse

Seminars. *Two 1½-hour sessions each week. 2.5 units.* Dr. Wechsler.

Covers the diagnosis, prevalence, and etiology of alcoholism and alcohol abuse. Topics include sex and cultural differences, high-risk groups, effects on health, accidental injuries, treatment, prevention, and public policy.

BEH 223d. Drug Addiction and Drug Abuse

Seminars, discussions. *Two 1½-hour sessions each week. 2.5 units.* Dr. Gortmaker.

Covers the prevalence of drug addiction and abuse. Topics include epidemiology, effects on health, etiology, prevention and treatment, and public policy.

Course instructor is Dr. McAuliffe.

BEH 230cd. Social and Behavioral Research Methods

Seminars. *Two 1½-hour sessions each week. 5 units.* Dr. Gortmaker.

Covers aspects of behavioral research methods, including research design, measurement, sampling, data collection, and data analysis. By case studies, methodological readings, and discussion, students learn the conduct and critical evaluation of experiments, surveys, measurement construction, longitudinal research, observational studies, and the use of structural equation models.

Prereq. BIO 200ab or BIO 201ab. A multivariate statistics course is strongly recommended.

BEH 300abcde. Tutorial Programs

Time and credit to be arranged.

Arrangements may be made with individual instructors to give a reading course on topics not covered in the department's course offerings.

BEH 350. Research Training

Training in research is available for doctoral candidates through individual arrangements with the members of the department.

■ **BIOSTATISTICS**

BIO 112a. Computing Principles and Methods I

Lectures, discussions. *Two 1½-hour sessions each week.*

Laboratory. *One 1½-hour session each week. 2.5 units.* Dr. Pagano, Dr. Fenton.
Introductory course designed to provide basic computer literacy to students from all disciplines. Topics include computer terminology, the organization, capabilities, and limitations of computers, data collection methods, programming principles, database management systems, telecommunications, and artificial intelligence in medicine.

BIO 113b. Computing Principles and Methods II

Lectures, discussions. *Two 1½-hour sessions each week.*

Laboratory. *One 1½-hour session each week. 2.5 units.* Dr. Pagano, Dr. Hunt.

A practical introduction to the principles of programming using the high-level language PASCAL and the IBM PC-XT.

Prereq. BIO 112a or equivalent.



Dr. Steven L. Gortmaker, Associate Professor of Sociology and Acting Chairman of the Department of Behavioral Sciences, runs Project LIFE, a community-based maternal and child health program.

BIO 200ab. Introduction to Statistical Methods

Lectures, discussions. *Two 1½-hour sessions each week.*

Laboratory. *One 1-hour session each week. 5 units.* Dr. Gelber, Dr. Anderson. Covers basic statistical techniques which are important for analyzing data arising from clinical and laboratory studies. Major topics include elements of probability, introduction to estimation and inference, distribution free methods, contingency tables, life tables, regression analysis, and elements of study design. Applications are stressed. Designed as an alternate to BIO 201ab, for students desiring more emphasis on theoretical developments or those having had an introductory statistics course at the level of BIO 201ab. Credit is not given for both BIO 200ab and BIO 201ab.

Prereq. A course in calculus.

BIO 201ab. Principles of Biostatistics

Lectures. *Two 1-hour sessions each week.* Laboratory. *One 2-hour session each week. 5 units.* Dr. Pagano.

Lectures and laboratory exercises acquaint the student with the basic concepts of biostatistics and their application and interpretation. Topics include descriptive statistics, probability distributions, inference, tests of significance, association, regression, and life tables.

Note: Credit is given for only one of these courses: BIO 200ab, BIO 201ab, or HPM-BIO 203b,c,d. This course cannot be counted as part of the credit requirement for a major or minor doctoral field.

HPM-BIO 203b, 203c, 203d. Statistical Methods for Health Policy and Management (Module I, II, III)

Lectures. *Three 2-hour sessions each week. 2.5 units each period.* Dr. Testa, Dr. DeGruttola.

(Course described under Health Policy and Management.)

BIO 204cd. Biostatistics for Medical Investigators

Lectures. *One 2-hour session each week. 2.5 units.* Dr. Gelman.

This course is aimed at fellows, residents, and clinical investigators. Topics include diagnostic test analysis (sensitivity, specificity, ROC curves, Bayes Theorem), risk of disease (prevalence, incidence, cohort studies, case control studies), treatment effects (summary statistics, single, paired, and two sample tests, analysis of proportions, survival data), models (linear, logistic, proportional hazards), and clinical trials (randomization, stratification, eligibility, blinding, interpretation).

BIO 205a. Statistical Issues in Clinical Research

Seminars. *Two 2-hour sessions each week. 2.5 units.* Dr. Feldstein.

The course is designed to introduce medical researchers to issues that arise in the planning and conduct of clinical research and to present them with resources (human and technologic) which will aid in the implementation of such research.

Prereq. Permission of the instructor (Kellogg Fellows, and Fellows in similar programs).

BIO 206s. Statistical Principles in Medical Research

Lectures. *Five 1½-hour sessions each week for eight weeks. 5 units.* Dr. Orav. Designed primarily for participants in the Training Program in Clinical Effectiveness. Topics include an introduction to concepts in probability and statistics, discrete data analysis, regression, analysis of variance, experimental design, and issues in clinical trials. Emphasis is on allowing participants to think about issues in designing and analyzing studies. Mathematical and theoretical issues are not pursued in depth. Prereq. Acceptance into the Program in Clinical Effectiveness, or sufficient quantitative background and medical training for a detailed course emphasizing clinical applications.

ESP-BIO 207cd. Statistical Methods in Biology

(Formerly BIO 263ab)

Lectures. *Three 1½-hour sessions each week. 5 units.* Dr. H. Feldman.

(Course described under Environmental Science and Physiology.)

BIO 210cd. The Analysis of Rates and Proportions

Lectures. *Two 2-hour sessions each week.* Laboratory (optional). *One 1-hour session each week. 5 units.* Dr. Kalish.

Emphasizes concepts and methods for analysis of data which are categorical, rate-of-occurrence (e.g., incidence rate), and time-to-event (e.g., survival duration). Stresses applications in epidemiology, clinical trials, and other public health research. Topics include measures of association, 2x2 tables, stratification, logistic regression, matched pairs, analysis of rates, and survival data analysis.

Prereq. BIO 200ab or BIO 201ab or equivalent.

BIO 211cd. Regression and Analysis of Variance in Experimental Research

Lectures. *Two 1½-hour sessions each week.*

Laboratory. *One 1-hour session each week. 5 units.* Dr. Larson.

Covers analysis of variance and regression, including details of data-analytic technique and implications for experimental design. Also included are probability models and some computing. Students

learn to formulate a scientific question in terms of a statistical model, leading to objective and quantitative answers.

Prereq. BIO 200ab or BIO 201ab or equivalent.

BIO 212cd. Survey Research Methods in Community Health

Lectures, discussions. *One 2-hour session each week. 2.5 units.* Dr. Zelen, Dr. Mangione.

Covers research design, sample selection, questionnaire construction, interviewing techniques, the reduction and interpretation of data, and related facets of population survey investigations. Focuses primarily on the application of survey methods to problems of health program planning and evaluation. Treatment of methodology is sufficiently broad to be suitable for students who are concerned with epidemiological, nutritional, or other types of survey research.

BIO 213cd. Vital and Health Statistics

To be given 1988-89; offered alternate years. Lectures and discussions. *One 2-hour session each week. 2.5 units.* Members of the Department.

Discusses the types, sources, methods of data collection, and uses of vital and health statistics for public health purposes. Emphasizes effective use of existing data, together with consideration of incomplete data and sampling methods for obtaining new information, both nationally and internationally.

BIO 214b. Principles of Clinical Trials

Lectures, discussions. *Two 2-hour sessions each week. 2.5 units.* Dr. Gelman.

Designed for individuals interested in the scientific, policy, and management aspects of clinical trials. Topics include types of clinical research, study design, treatment allocation, randomization and stratification, quality control, sample size requirements, patient consent, and interpretation of results. Students design a clinical investigation in their own field of interest and critique recently published investigations. Prereq. Previous or concurrent enrollment in an introductory statistics course.

BIO 215cd. Mathematical Foundations of Biostatistics

Not given 1988-89; offered alternate years. Lectures. *One 2-hour session each week. 2.5 units.* Members of the Department.

Material includes mathematical descriptions of commonly used distributions; standard procedures for estimating the moments of a distribution; and mathematical foundations of statistical inference, including the Neyman-Pearson lemma, the likelihood ratio, the central limit theorem, power and Bayesian inference.

Prereq. A course in elementary calculus.

BIO 220ab. Methods of Data Analysis
Lectures, discussions. *Two 1½-hour sessions each week.*

Laboratory (optional). *One 1½-hour session each week. 5 units.* Members of the Department.

A course in basic statistical methods for data analysis. Topics included are the analysis of normally distributed data, including linear regression models and ANOVA, distribution free methods, ideas of generalized linear models, and an introduction to discrete data methods. Methods of modeling, least squares, and maximum likelihood are discussed.

Prereq. At least one course in statistics which uses the calculus, or permission of instructor.

BIO 221cd. Discrete Multivariate Analysis

Lectures. *Two 1½-hour sessions each week.*

Laboratory (optional). *One 1-hour session each week. 5 units.* Dr. Ware.

Deals with the use of log linear and logistic models for analyzing count data. Emphasizes practical application rather than mathematical theory. Extensive use is made of computer packages for data analysis. Topics include the analysis of contingency tables, chi-square and exact tests, measures of association, logistic regression, log linear analysis using iterative proportional fitting, and the binomial, multinomial, and Poisson distributions. Prereq. One or more of the following courses: BIO 200ab, BIO 210cd, BIO 211cd, or equivalent.

BIO 230ab. Probability Theory and Applications

Lectures. *Two 1½-hour sessions each week. 5 units.* Dr. Kim.

A course in probability theory fundamental to the statistics program. Topics include algebra of events, axiomatic foundations, combinatorial probability, discrete and continuous sample spaces, Stieltjes integration, conditional probability and independence, random variables, generating functions and characteristic functions, standard distributions, expectation and variance operators, limit theorems, Poisson processes, and applications in health-related areas.

Prereq. Intermediate calculus (one or two semesters beyond elementary calculus).

BIO 231cd. Statistical Inference

Lectures. *Two 1½-hour sessions each week.*

Laboratory. *One 1½-hour session each week. 5 units.* Dr. Begg.

A fundamental course in statistical inference. Topics include sufficiency, exponential families, parameter estimation, maximum likelihood, Bayesian theory, small and large sample properties of estimators, interval estimation, hypothesis testing, Neyman Pearson theory, score tests, likelihood ratio tests, and similar tests. The theory will be illustrated with examples from health-related research. Prereq. BIO 230ab or equivalent.

BIO 235ab. Regression and Analysis of Variance

Lectures. *Two 1½-hour sessions each week.*

Laboratory. *One 2-hour session each week. 5 units.* Dr. Zelen.

Describes general procedures of estimation and hypothesis testing for linear models: least squares and maximum likelihood estimation, Cochran's theorem, Gauss-Markov theorem, estimable functions, multivariate normal distribution, and simultaneous inference. Discusses techniques of analysis of variance and experimental design: partitioning sum of squares, factorial experiments, nested designs, analysis of covariance, and repeated measures. Prereq. BIO 231cd or equivalent; familiarity with matrix algebra. BIO 211cd or equivalent recommended.

BIO 236ab. Theory of Biometry I

Lectures. *Two 2-hour sessions each week. 5 units.* Dr. Tsiatis.

Discusses the theoretical basis of concepts and methodologies associated with survival data and censoring, nonparametric tests, competing risk models, carcinogenicity testing, and low dose extrapolation. Material is drawn from recent literature. Prereq. BIO 221cd and BIO 231cd or permission of the instructor.

BIO 245cd. Multivariate Analysis for Quantitative Data

Not given 1988-89; offered alternate years. Lectures, student presentations. *Two 1½-hour sessions each week. 5 units.* Dr. Ware.

An introduction to the fundamentals of multivariate analysis and the analysis of serial measurements. Topics include the multivariate normal distribution, estimation of the mean and covariance matrix, Hotellings T^2 , principal components, factor analysis, random effects and mixed models, and variance components. Reviews classical methods for the analysis of repeated measures and longitudinal data and presents newer methodology based on random effects and time series formulations. Discusses computational issues for both traditional and new methodologies. Prereq. At least one statistics course beyond the level of BIO 235ab. Knowledge of matrix algebra and some familiarity with computer packages such as SPSS, BMDP, or SAS.

BIO 246cd. Theory of Biometry II

To be given 1988-89; offered alternate years.

Lectures, discussions. *Two 1½-hour sessions each week. 5 units.* Dr. Lagakos, Dr. Gray, Dr. Zelen.

This course is divided into three distinct units: stochastic processes and biomedical phenomena, theory of logistic and polychotomous regression, and the use of GLIM for model building. Topics to be discussed are point processes, recurrent events, and screening for early detection of disease; conditional logistic regression and its generalizations, models for binary time series, tests on Markoff chains, and extensions to

urn models; theory and practice of generalized linear models, use of quasi-likelihood, and issues of extra-variation.

Prereq. BIO 231cd, BIO 236ab, or permission of the instructor.

BIO 247cd. Design of Scientific Investigations

To be given 1988-89; offered alternate years.

Lectures. *Two 1½-hour sessions each week. 5 units.* Dr. Laird.

Discusses those aspects of statistical theory and practice relative to the design of scientific investigations in the health sciences. Topics include planning of sample surveys; basic principles of experimental design: randomization, replication, and balance; randomization related to distribution-free methods; fixed, mixed, and random models; experimental designs and techniques for reducing variability; block designs and analysis of covariance; human studies; multicenter longitudinal follow-up and observational studies; sequential studies; adaptive and allocation rules; special features with discrete response data. Prereq. BIO 235ab or permission of the instructor.

BIO 251cd. Statistical Inference II

Lectures. *Two 1½-hour sessions each week. 5 units.* Dr. Lagakos.

This course covers several topics in statistical inference oriented to students in the biostatistics doctoral program. Topics include limit theorems, asymptotic properties of likelihood methods, nonparametric methods and rank tests, efficiency, ancillarity and conditioning, and isotonic regression.

Prereq. BIO 231cd. Permission of the instructor required.

BIO 260cd. Mathematical Models in Biology

Not given 1988-89; offered alternate years. Lectures, discussions. *One 2-hour session each week. 2.5 units.* Dr. H. Feldman, Dr. Awerbuch.

Mathematical models as a basis for analyzing biological phenomena. An intermediate-level course for students in laboratory science and biostatistics. Applied topics include carcinogenesis, compartmental distribution of drugs and toxic substances, molecular binding, diffusion bioassay, membrane transport, cell and enzyme kinetics, and physiologic scaling. Methodological topics include curve-fitting, experimental design, and computer simulation.

Prereq. Introductory calculus; BIO 210cd or BIO 211cd (may be concurrent).

Topics in Biostatistics (BIO 265ab)

Offered primarily for students majoring in biostatistics or epidemiology, although qualified students from other departments are welcome. The topics covered vary from year to year, based on recent developments in biostatistics and the research interests of the instructor.

BIO 265ab. Applied Survival Analysis
Lectures. *Two 1½-hour sessions each week.* 5 units. Dr. D. Harrington.

This is an applied course for those wishing to learn about modern developments in the practice of survival methods. Topics include parametric distributions (exponential, Weibull), role of the hazard function, estimation of survival distributions using life table and maximum likelihood methods, two population problems, proportional hazard models and regression, tests of proportional hazard assumption, and software for implementing testing and estimation procedures. Connections to logistic regression and log-linear regression models for Poisson data will be discussed. Emphasis is on practical experience in survival data analysis.

Prereq. BIO 210cd or BIO 221ed, or equivalent.

ESP-BIO 267e. Introduction to Statistical Methods in Biology

Lectures. *One 2-hour session each day for five days.*

Laboratory. *One 2-hour session each day for five days.* 1.25 units. Dr. H. Feldman. (Course described under Environmental Science and Physiology.)

BIO 273ab. Introduction to Computing
Lectures. *Two 1½-hour sessions each week.*

Laboratory. *One 1½-hour session each week.* 5 units. Dr. Orav.

An intermediate-level course introducing students to some computer-intensive methods useful in biostatistics. Provides an overview of computing, covering hardware, systems software, and biostatistical applications software. Most course time is spent learning fundamental ideas and algorithms involved with numerical analysis, matrix operations, simulation, and graphics. Computer implementation of selected, frequently used techniques, such as non-linear regression stochastic modeling, or bootstrapping, is discussed.

Prereq. BIO 113b and BIO 200ab. This course is available for credit for students who took BIO 273ab in 1986–87 or 1987–88.

BIO 275d. Applied Data Management

Lectures, demonstrations. *Two 1½-hour sessions each week.*

Laboratory. *One 1½-hour session each week.* 2.5 units. Dr. Testa.

Introduces management of data, both external and internal to computer data bases, concepts and techniques for handling data before it is ready for analysis, and practical aspects of computer data base design and usage. Topics include data collection, forms and coding, data entry systems, quality control, data base structures (both logical and physical), data base management systems, file organization, and data models.

Prereq. BIO 273ab or equivalent or permission of the instructor.



HPM-BIO 280c. Decision Analysis for Health and Medical Practices

(KSG S-176m)

Lectures, discussions. *Two 2-hour sessions each week.* 2.5 units. Dr. Weinstein. (Course described under Health Policy and Management.)

HPM-BIO 281d. Seminar on Clinical Decision Analysis

Seminars. *Two 2-hour sessions each week.* 2.5 units. Dr. Politser. (Course described under Health Policy and Management.)

HPM-BIO 282d. Cost-Effectiveness and Cost-Benefit Analysis for Health Program Evaluation

Seminars, lectures. *Two 2-hour sessions each week.* 2.5 units. Dr. Weinstein, Dr. Graham. (Course described under Health Policy and Management.)

HPM-BIO 283b. Behavioral Decision Theory in Health

Lectures, discussions. *Two 2-hour sessions each week.* 2.5 units. Dr. Politser. (Course described under Health Policy and Management.)

HPM-BIO 284a. Topics in Decision Theory

Lectures, seminars. *One 3-hour session each week.* 2.5 units. Dr. Politser. (Course described under Health Policy and Management.)

ESP-BIO 290cd. Advanced Methods in the Analysis of Environmental Health Data

Lectures. *One 2-hour session each week.* 2.5 units. Dr. Robins. (Course described under Environmental Science and Physiology)

BIO 310-315abcd. Tutorial Programs
Time and credit to be arranged.

An opportunity for tutorial work is offered for interested and qualified students or small groups of students. Arrangements must be made with individual faculty members and are limited by the amount of faculty time available. These programs are open to students specializing in biostatistics and also to students in other fields who wish to go beyond the content of the regular courses. Six broad categories of this tutorial instruction are identified by the six course numbers below.

310 Statistical Methods

Guided study in specific areas of statistical methodology and applications.

311 Teaching

Work with members of the department in laboratory instruction and the development of teaching materials.

312 Consultation

Work with members of the department on current statistical consultation activities.

313 Computing

Guided study in scientific programming, numerical methods, and data management.

314 Study Design

Guidance in developing statistical design of a study in which the student has a particular interest.

315 Data Analysis

Guidance in the statistical analysis of a body of data in which the student is interested.

Students may register for BIO 310-315 for a maximum of 5 credit units in the summer term.

BIO 350. Research

Candidates for the Doctor of Public Health or Doctor of Science degree may arrange for individual research. The work may be part of the program for a doctorate in this department or may be integrated with doctoral research in other departments.

■ CANCER BIOLOGY

CB 202b. Critiques of Current Literature in Virology and Immunology
Seminars. *One 2-hour session each week.* 1 unit. Members of the Department.

Papers on topics of general interest are selected from current periodicals and critically reviewed as to soundness of experimental design, validity and significance of results and conclusions, organization of manuscript, and clarity of presentation. The course is not given if less than eight students enroll.

CB 204ab. Immunobiology

Lectures. *One 1½-hour session each week. 5 units.* Dr. Glimcher, Faculty and Guest Lecturers.

Examines the anatomy and physiology of the immune system, fate of antigen, cell trafficking, cellular interactions, and regulation of the immune response, and B and T cell recognition mechanisms. Principles of immunoregulation are discussed in the context of current literature. Grade is based on class participation and a paper. Students must have basic courses in microbiology and immunology and approval of the instructor.

CB 207cd. Radiation Biology

Not given 1988–89; offered alternate years. Lectures. *Three 1-hour sessions each week. 5 units.* Dr. Little.

This course is divided into two parts: cellular and human radiobiology. The first includes radiation chemistry, cell survival, transformation and mutagenesis, cytogenic effects, UV-photobiology, and cellular and molecular repair processes. The second covers effects of radiation in man and characteristics of internal and external human exposure. The biologic basis of the acute radiation syndrome and the human epidemiologic data for radiation carcinogenesis are emphasized.

Prereq. ESP 205ab or college-level course in biology.

CB 212ab. Introduction to Cancer Biology

Not given 1988–89; offered alternate years. Lectures and discussions. *Two 1½-hour sessions each week. 5 units.* Dr. Kennedy, Dr. Eisenstadt, Dr. Cairns, Guest Lecturers. Emphasizes current experimental approaches to studying cancer biology and the process of carcinogenesis. Topics include the biology of cell modification and differentiation, the phenotype of the cancer cell, the properties of human and animal cancers, the process of cell transformation, mutagenesis, carcinogen metabolism and the general features of cancer epidemiology, and what these say about the causes of human cancer. Early in the course, several introductory lectures are given to cover basic concepts of genetics, cell biology, and molecular biology. A background in some branch of science is desirable.

CB 217ab. Human and Animal Virology (Virology 101 and Animal Virology 2684)

Not given 1988–89; offered alternate years. Lectures. *Two 1½-hour sessions each week. 5 units.* Dr. Essex, Dr. Mullins.

Provides students with fundamentals of medical virology and introduces the new and relevant concepts emanating from recent and ongoing research. Topics include virus-host cell interaction, molecular aspects of virus replication and pathogenesis, pathogenesis, chronic and latent infections, epidemiology, environmental factors, host defense mechanisms,

molecular and virological techniques, and community control measures. Selected virus groups are discussed in detail.

Students should discuss enrollment with instructor before registering. Minimum enrollment of 8 required to offer course.

CB 219cd. Advanced Cancer Cell Biology

(Biophysics 203)

Lectures. *One 2-hour session each week. 5 units.* Dr. Haseltine, Dr. Chen (Harvard Medical School).

This is an advanced-level course for those planning to do research in the areas of carcinogenesis, tumor cell biology, and cancer pharmacology. Examines the nature of cancer at the molecular level. Explores the differences between normal cells and tumor cells in animals and in tissue culture. Draws upon cell biology, viral oncology, tumor immunology, and genetics. Specific topics include viral and chemical carcinogenesis, genetics of cancer and the transformed state, the nature of virus coded transformation functions, exogenous control of cell growth, the cell surface of normal and transformed cells, cell structure and mobility, the differences between benign and malignant tumors, the problem of metastasis, and mutation and differentiation as models for cancer.

Suggested prereq. Cell Biology 202, *The Biology of the Cancer Cell*; Biochemistry 165, *Oncogenic Viruses*; CB 217ab; or equivalent.

CB 302-308abcd. Tutorial Programs

Time and credit to be arranged.

Enrollment requires the consent of the staff member responsible for supervision of the research. The various subject areas are listed below by category.

302 Viruses

Dr. Essex, Dr. Haseltine, Dr. Mullins. Isolation and identification of representative viruses by use of cell culture, animal inoculation, and serologic and molecular biological techniques.

303 Immunochemical Methods

Dr. Essex, Members of the Department.

Methodology of immunofluorescence, enzyme-linked immunoassays, ⁵¹Cr release, chromatography, immunoelectrophoresis, monoclonal antibodies as applied to oncogenesis, and resistance to infectious viral agents.

304 Public Health Laboratory

Associates at the State Laboratory Institute.

The State Laboratory Institute is engaged in a variety of programs related to public health. These include the development, preparation, and testing of new and standard serums, vaccines, and blood fractions; research in various aspects of applied immunology; various

aspects of diagnostic service in the fields of bacteriology, virology, and congenital metabolic disorders; and field studies on arboviruses. Individual arrangements for study can be made in any of these programs.

305 Tumor Biology

Members of the Department.

Approaches and techniques for the study of cancer as an infectious disease. Procedures used to study tumor cell and tumor virus marker antigens and antibodies demonstrated. The significance of these markers for epidemiological, etiological, and diagnostic investigations of various tumor systems of known and unknown causes discussed. The relationship between the immune response and the oncogenic process examined.

306 Cellular Immunology and Molecular Biology of the Immune System Dr. Glimcher.

Examines the events following immunization of infection where the quality and quantity of the immune response is regulated by subsets or lymphocytes and their products. The mechanism of this regulation is explored by analyzing immunologic circuits, idiotypic recognition, and antibody and cell mediated cytotoxicity.

307 Radiobiology

Dr. Little, Dr. Kennedy.

Current topics in radiobiology at molecular, cellular, and organismal levels. Cytotoxic, mutagenic, and carcinogenic consequences of ionizing and nonionizing radiations are examined, with emphasis on genetic, physiologic, and environmental factors that modify these biologic effects.

308 Chemical Carcinogenesis

Dr. Cairns, Dr. Haseltine.

Methodology and interpretation of tests for chemical carcinogens, mutagenesis and repair of DNA, and the time course of the formation of cancer.

CB 350. Research

Qualified doctoral candidates, research fellows, and full-time special students may register for CB 350 to undertake original research in virology, bacteriology, immunology, or in one of the disciplines available at the State Laboratory Institute. A number of the current research activities of the department are listed under CB 302-308. Inquiries about specific research opportunities should be addressed to the chairman of the department.



Dr. James Mullins, Associate Professor of Virology, is developing a simian immunodeficiency virus model which is expected to provide important insights about AIDS.

■ ENVIRONMENTAL SCIENCE AND PHYSIOLOGY

ESP 201a, ESP 201c. Principles of Environmental Health I

Lectures. *Two 2-hour sessions each week.* 2.5 units. Dr. Moeller.

Represents a first step in a review of the more important environmental health problems facing society. Topics include environmental physiology, radiation protection, community air pollution, occupational health, and municipal water purification and wastewater treatment. Students are required to develop and submit plans for a term paper.

Note: Students in the MPH program are required to take this course, plus either ESP 202b or ESP 203d. For convenience in scheduling, ESP 201 is offered in both the "a" and "c" periods.

ESP 202b. Principles of Environmental Health II

Lectures. *Two 2-hour sessions each week.* 2.5 units. Dr. Moeller.

Represents a continuation in the review of the more important environmental health problems facing society. Topics include energy and the environment, environmental toxicology and hazardous waste management, environmental law and economics, accidents and public health, insect and rodent control, and environmental monitoring. Submission of a completed term paper is required.

ESP 203d. Principles of Environmental Health III

Lectures. *Two 2-hour sessions each week.* 2.5 units. Dr. Moeller.

Emphasizes environmental health problems in the less-developed countries. Topics include individual household water supplies and wastewater treatment; basic sanitation; insect and rodent control; food-borne diseases; housing and home accidents; operation, maintenance, and management of environmental systems; and the selection of appropriate technology for coping with such problems. Submission of a completed term paper is required.

Note: Students in the MPH program are required to take either this course or ESP 202b, plus ESP 201a or ESP 201c. Because of the special orientation of the subject matter presented, it is suggested that students interested in environmental health problems in the less-developed countries enroll in ESP 203d. Students interested in the subject matter in this course, as well as that presented in ESP 202b, may take both courses, as well as ESP 201a or ESP 201c, and receive credit for all three courses (7.5 units).

ESP 205ab. Human Physiology

Lectures, conferences, demonstrations. *Two 1-hour and one 2-hour session each week.* 5 units. Dr. Reid, Members of the Respiratory Biology Program.

Students, including those lacking a background in biology, are offered an intensive introduction to biological principles and to the physiology of cells, organ systems, and organisms. Some pathophysiology and several laboratory exercises are included. Students without college courses in physics, chemistry, and mathematics should speak with the instructor beforehand.

ESP-BIO 207cd. Statistical Methods in Biology

(Formerly BIO 263ab)

Lectures. *Three 1½-hour sessions each week.* 5 units. Dr. H. Feldman.

Teaches descriptive and inferential data analysis by means of examples in biochemistry, genetics, cell biology, physiology, and population biology. Topics include probability, discrete data, normal comparisons, analysis of variance, experimental design, simple regression, and model building.

Prereq. Concentration in biological sciences, preparation in elementary statistics, and permission of the instructor.

EPI-ESP 215cd. Case Studies in Environmental and Occupational Epidemiology

Lectures, seminars. *One 2-hour session each week.* 2.5 units. Dr. Monson, Dr. Robins, Dr. Dockery.

(Course described under Epidemiology.)

ESP 221cd. Methodology in Cell Biology

Not given 1988–89; offered alternate years. Lectures. *Two 2-hour sessions each week.* Laboratory/review sessions. *To be arranged.* 5 units. Dr. Valberg, Members of the Department, Guest Lecturers.

Provides an overview of experimental approaches in cell biology used to study cytoplasmic structure, secretory products, the plasma membrane, the nucleus, cell organelles, and macromolecules. The goal is to appreciate how our view of cell structure and function is shaped by the methods we have available to examine cells. Techniques such as electron microscopy (morphometry and stereology), protein fractionation, markers (fluorescent, immune, radioactive), molecular biology of DNA, cell cycle analysis, quantitative light microscopy, and nuclear magnetic resonance are presented along with integrative material on the relationship of cell biology to inhalation toxicology, pathogenesis of disease, and evaluation of cell function and injury. Whenever possible, lecture demonstrations or laboratory demonstrations are used to help present the methods used in cell research.

ESP 222cd. Structure and Function of the Mammalian Respiratory System

To be given 1988–89; offered alternate years.

Lectures, tutorials. *Two 1½-hour sessions each week.*

Demonstrations, discussions. *To be arranged.* 5 units. Dr. Loring, Dr. Butler, Dr. Banzett, Members of the Department.

A survey of the "respiratory pump" responsible for pulmonary ventilation. Anatomy and mechanics of respiratory muscles, respiratory muscle physiology and pathology, control of respiratory muscle activation, and coordination in normal and diseased states. Requirements include lectures, demonstrations, discussions, term paper, and oral presentations.

Prereq. College-level course in human or animal physiology. Other students are encouraged, but should see Dr. Loring.

ESP 231cd. Occupational Health Policy and Administration

Seminars. *Two 2-hour sessions each week.* 5 units. Dr. Monson, Dr. Boden, Mr. Barmack, Dr. Nobel.

Examines the legal, economic, and political foundations of occupational health activities in the United States. Discusses the roles of government, unions, corporations, and research organizations. Helps students acquire an understanding of management functions in corporations. Enables students to develop the knowledge and skills in the above areas necessary to apply medical, industrial hygiene, and statistical skills to achieve a healthful workplace.

ESP 232cd. Introduction to Occupational Medicine

Lectures. *One 2-hour session each week. 2.5 units.* Dr. Christiani, Dr. Kelsey. Reviews the diagnosis and management of occupational diseases following exposure to specific workplace substances, including asbestos, lead, organic solvents, and other substances. Methods of diagnosis of early organ system effects of chemicals and techniques for assessing disability are considered. The course is limited to physicians or others with adequate training by permission of the instructor.

ESP 233b. Industrial Toxicology

Lectures. *Two 2-hour sessions each week. 2.5 units.* Dr. Kelsey, Dr. Karstadt, Dr. Greaves.

Provides detailed information on organ system effects of exposure to workplace chemicals, with emphasis on understanding the pathogenesis of toxin-induced disease and on developing programs for early detection of such conditions. Pulmonary effects receive particular attention. In the second half of the course, effects of exposure to common workplace toxins (e.g., asbestos, lead, solvents, pesticides, other metals, allergens) are discussed.

Prereq. TOX 204a and ESP 251a.

No credit is given for ESP 233b until successful completion of TOX 204a.

ESP 234cd. Basic Problems in Occupational Health

Lectures. *Two 2-hour sessions each week, "c" period; one 2-hour and one 3-hour session each week, "d" period. 5 units.* Dr. Greaves, Dr. Ferris, Prof. Burgess, Dr. Ciriello.

Focuses on the assessment of workplace hazards, the physiology and biomechanical aspects of work, and a practical problem-solving approach to health problems in various work settings. Case studies and walk-through field trips to local industries complement didactic material. The relationship between working conditions and health is emphasized, with special reference to the recognition, measurement, and control of industrial hazards. Prereq. ESP 251a, ESP 205ab, or equivalent.

ESP-EPI 235ab. Scientific Basis of Occupational Health Regulations

Seminars. *Two 2-hour sessions each week. 5 units.* Dr. Eisen, Dr. Robins, Dr. Kriebel.

Provides students with the opportunity to review the scientific basis for the association of selected occupational exposures and disease. Special emphasis is placed on evaluation of the epidemiologic literature, and on occupational cancer, respiratory disease, and other kinds of occupational morbidity. Attention is directed to the inter-

face of science and regulatory policy and the role of risk analysis in setting health standards.

Enrollment limited to 15.

Prereq. EPI 200a or EPI 201a, BIO 200ab or BIO 201ab, ESP 234cd or permission of the instructors. EPI-ESP 215cd is strongly recommended.

ESP 237ab. Introduction to Occupational Health Nursing

Lectures. *Two 2-hour sessions each week. 5 units.* Dr. Monson, Ms. Travers.

Covers the fundamental concepts of occupational health and safety relevant to the planning and implementing of targeted programs for workers, and provides a forum for discussion of related social, political, economic, legal, medical, and nursing issues. Topics include environmental determinants of health, factors which promote or inhibit the health of workers, delivery of health services in the work setting, and skills and strategies essential to the development of leadership roles in occupational health nursing.

ESP 238ab. Occupational Health Nursing Management

Not given 1988-89.

Lectures, seminars. *One 2-hour session each week. 2.5 units.* Dr. Monson, Ms. Travers.

Students apply skills and knowledge in occupational health nursing and occupational health and safety to the development of appropriate occupational health programs. Includes organizational development, communication skills, and techniques for managing change. This is considered an advanced course in occupational health nursing.

Required for all students in Occupational Health Nursing.

ESP 239cd. Case Studies in Occupational Health Nursing

Seminars. *One 2-hour session each week. 2.5 units.* Dr. Monson, Ms. Travers.

Provides a foundation for the development of skills and strategies necessary for program planning and development in occupational health through the critique of case studies of workplace situations and circumstances. Students identify health hazards, review injury/illness data, evaluate existing occupational health programs, and make recommendations. Prepares students for field placement in occupational health nursing.

ESP 241cd. Occupational Safety

Lectures, discussions. *One 2-hour session each week. 2.5 units.* Dr. Snook, Dr. Mangone.

Covers the principles of occupational safety. Topics include growth of the field of occupational safety; safety regulation and

standards; theoretical models of accident causation; accident investigation procedures; and engineering, behavioral, and administrative techniques for accident control. Builds toward the development and validation of prescriptive systems for the alleviation of workplace hazards.

ESP 243ab. Ergonomics/Human Factors

Lectures, demonstrations. *One 2-hour session each week. 2.5 units.* Dr. Snook.

Emphasizes the design of the job to fit the worker. Specific problems are investigated which result from the nature of the job itself, e.g., low back injuries, fatigue, hand disorders, slips and falls, human error, and psychological stress. The physiological, psychological, and anatomical characteristics of the worker are considered in the development of good job design principles.

ESP 251a. Health Hazards of Manufacturing Processes

Lectures, field trips. *One 2-hour and one 3-hour session each week. 2.5 units.* Prof. Burgess.

Deals with the recognition of health hazards in the workplace and the atmospheric environment, using a unit operations approach to manufacturing processes. Designed as an introduction to other courses which consider the evaluation and control of hazardous conditions in the workplace and atmospheric environment.

ESP 253cd. Environmental Control (ENG SCI 270)

Lectures. *One 2-hour session each week. Laboratory. One 3-hour session each week. 5 units.* Prof. Burgess, Dr. Cudworth, Mr. Di Berardinis.

Covers the design and evaluation of local and general exhaust ventilation systems for the control of toxic air contaminants; control of heat stress in industry; respiratory protection equipment; the fundamentals of sound and vibration generation, transmission, and reception; and noise control fundamentals. These topics are explored by means of lecture, laboratories, and field trips to industrial plants. Required for concentrators in industrial hygiene and air pollution control.

ESP 261cd. Properties of Airborne Contaminants (ENG SCI 276)

Lectures. *Two 1-hour sessions each week. Laboratories. One 4-hour session each week. 5 units.* Dr. Spengler, Dr. Rudnick. Covers the properties of airborne contaminants (aerosols, gases, vapors) and the physical principles underlying their behavior. Topics include particle motion due to gravitational, thermal, and electrostatic forces; diffusion; particle impaction; filtration; and physical properties of gases and

vapors. Laboratories cover optical and electron microscopy, sampling, measuring concentrations, and particle size measurement.

Required for concentrators in industrial hygiene and air pollution control.

Prereq. Calculus and college physics.

ESP 262ab. Assessment and Evaluation of Environmental Exposure (ENG SCI 273)

Lectures. *Two 2-hour sessions each week. 5 units.* Dr. Evans, Dr. P.B. Ryan.

Covers principles of exposure assessment; introduces basic methods for monitoring and modeling ambient concentrations; examines relationships between concentration, exposure, and dose; discusses risk assessment and its relationship to exposure evaluation. Required for concentrators in air pollution, environmental management, industrial hygiene, and/or radiation protection.

Prereq. Calculus and chemistry, or permission of the instructor.

ESP 263cd. Analytical Chemistry and Exposure Assessment

Lectures. *One 2-hour session each week. Laboratory. One 4-hour session each week. 5 units.* Dr. P.B. Ryan, Dr. Yanagisawa.

Exposes students to various techniques in analytical chemistry appropriate for environmental assessment in occupational and community settings. Groups of students are required to use these techniques in the design, implementation, and presentation of projects in environmental assessment. The course requires field work.

Prereq. Permission of the instructor.

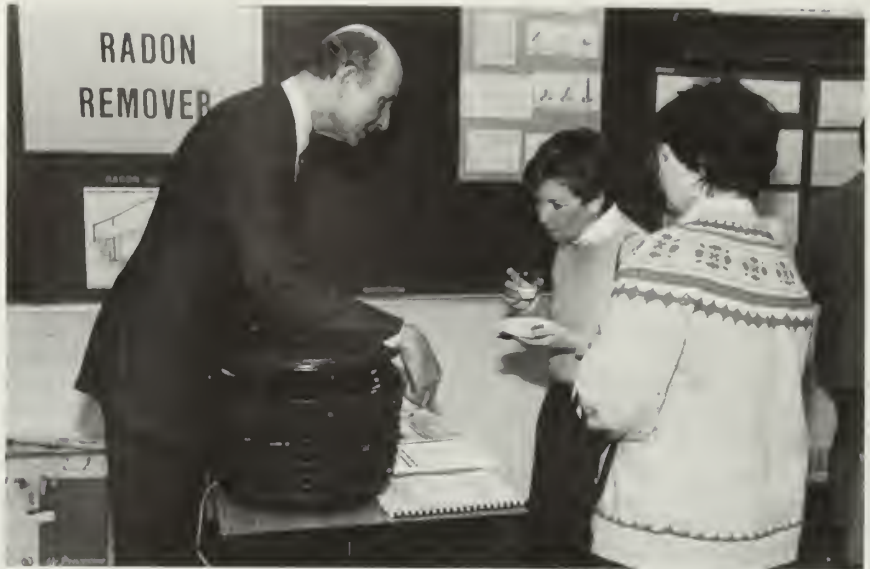
ESP 264c/264d. Environmental Health Evaluation and Management

Lectures, seminars. *Two 2-hour sessions each week. 2.5 units each period.* Dr. Evans, Dr. J. Harrington, Dr. P.B. Ryan. Introduces quantitative approaches for modeling, evaluation, and management, with an emphasis on applications in environmental health. Techniques include linear programming, statistical decision analysis, simulation, and error analysis. Examples drawn from environmental engineering, natural resource development, and risk management literature are examined using a systems analysis framework. Uses personal computers. Required for concentrators in Environmental Health Management. ESP 264c may be taken separately by students in other programs or departments. Prereq. Calculus, statistics, and familiarity with personal computers, or permission of instructor.

ESP 265cd. Air Pollution and Hazardous Waste

Lectures, seminars. *Two 2-hour sessions each week. 5 units.* Dr. Spengler, Dr. First, Dr. Ferris.

Critically examines the federal and state laws governing hazardous waste and air pollution. Reviews health effects, damage



Dr. Dade Moeller, Professor of Engineering in Environmental Health and Associate Dean for Continuing Education, discusses the removal of radon at the school's annual Poster Day.

to animals, plants, and groundwater that may occur directly or by intermedia transport. Presents control, legal, and enforcement aspects.

Prereq. (suggested) ESP 261cd, ESP 262ab, ESP 263cd.

ESP-BIO 267e. Introduction to Statistical Methods in Biology

Lectures. *One 2-hour session each day for five days.*

Laboratory. *One 2-hour session each day for five days. 1.25 units.* Dr. H. Feldman. Intensive preparatory course for ESP-BIO 207cd. Covers elements of statistical data analysis in biological laboratory science, including laws of probability, normal and binomial distributions, descriptive statistics, and tests of hypothesis. Examines applications in biochemistry, genetics, cell biology, and physiology.

Prereq. Concentration in biological sciences and permission of the instructor.

ESP 270b. Basic Radiation Protection (One half of ENG SCI 278)

Not given 1988–89; offered alternate years. Lectures, demonstrations. *Two 2-hour sessions each week. 2.5 units.* Dr. Shapiro, Dr. Moeller.

Covers principles of radiation protection, interaction of ionizing particles with matter, the concept of radiation dose from external and internal sources, dose calculations, and radiation measurements.

ESP 271d. Occupational and Environmental Radiation Protection (One half of ENG SCI 278)

Not given 1988–89; offered alternate years. Lectures, demonstrations. *Two 2-hour sessions each week. 2.5 units.* Dr. Shapiro, Dr. Moeller.

Covers biological effects of radiation; radiation epidemiology; radiation protection

standards and regulations; laboratory, industrial, and environmental sources of radiation; and methods of environmental and occupational radiation protection.

Prereq. ESP 270b or equivalent.

ESP-BIO 290cd. Advanced Methods in the Analysis of Environmental Health Data

Lectures. *One 2-hour session each week. 2.5 units.* Dr. Robins.

Focuses on the instructor's new approach to causal inference in observational studies with sustained exposure periods. Particular attention is paid to the problems that arise when risk factors determine subsequent exposure. Philosophical, statistical, computational, and subject matter issues are considered. Emphasis is on the use of this approach in the control of the healthy worker effect in occupational mortality studies. The use of this new approach in nonexperimental evaluations of the benefits of screening for cancer and of smoking cessation is also considered.

Prereq. Knowledge of epidemiology to the level of EPI 207a and familiarity with statistical models (e.g., logistic regression models).

ESP 300abcd. Tutorial Programs

Time and credit to be arranged.

Opportunities are provided for individual tutorial work for qualified students in the fields of respiratory biology, respiratory epidemiology, occupational medicine, industrial hygiene and ventilation, aerosol technology, radiological health, nuclear medicine, solid waste management, air pollution control, and environmental health management.

ESP 330e. Field Work

One-week period between fall and spring terms. 1 unit.

A week of supervised field observation is offered to students, who may choose appropriate visits to medical or industrial hygiene departments of industries, airports, and other agencies which have operations or research in the field of environmental health. Field work arrangements are generally made early in the fall term.

ESP 350. Research

Doctoral students may undertake theoretical, laboratory, or field research under the direction of faculty members working in the following areas:

Air Pollution

Dr. First, Dr. Spengler, Dr. P.B. Ryan, Dr. Yanagisawa, Dr. Ferris, Dr. Speizer, Dr. Dockery.

Industrial gas cleaning, personal exposure monitoring, assessing air pollution potential from simple and complex pollution sources, indoor air pollution, health effects of air contaminants, epidemiology.

Environmental Health Management

Dr. Moeller, Dr. Hornig, Dr. J. Harrington, Dr. Evans.

Quantitative methods of environmental management, risk analysis, environmental standards, and criteria.

Industrial Hygiene

Prof. Burgess, Dr. P.B. Ryan, Dr. Evans. Monitoring exposures of occupational groups to toxic air contaminants, aerosol, physics, and ventilation; ergonomics applications to job design.

Inhalation Toxicology

Dr. Brain, Dr. Valberg. Biological responses to inhaled particles and gases, deposition and clearance mechanisms.

Mathematical Physiology

Dr. H. Feldman, Dr. Butler. Modeling of organ systems, experimental design.

Occupational Health

Dr. Monson, Dr. Christiani, Dr. Eisen, Dr. Greaves, Dr. Kelsey, Dr. Kriebel, Dr. Robins. Epidemiological and field studies, health hazard evaluation.

Radiological Health

Dr. Reid, Dr. Shapiro. Reduction of dose from sources of natural origin, radiation safety criteria and standards, control of radioactive contamination.

Respiratory Mechanics

Dr. Banzett, Dr. Drazen, Dr. Loring, Dr. Reid. Physiological theory and measurement of respiratory function.

Solid Wastes

Dr. First. Incineration of solid wastes, including municipal, radioactive, biological, and laboratory materials.

The following courses, offered in the Harvard Faculties of Arts and Sciences and Government, and at the Massachusetts Institute of Technology, are open to qualified students from the School of Public Health and may be of interest to students of environmental health sciences.

Earth and Planetary Sciences 30. Introduction to the Microbiology of Soil and Water

Half course (*fall term*). R. Mitchell.

Engineering Sciences 162. Hydrologic Cycles

Half course (*fall term*). Tu., Th., 10-11:30. Fiering.

Prereq. Applied Mathematics 21b and one year of college-level physics.

Engineering Sciences 260. Engineering Systems for Environmental Control

To be given 1988-89; offered alternate years. Half course (*spring term*). M., W., F., at 10. J. Harrington.

Prereq. Engineering Sciences 123 or permission of the instructor.

Engineering Sciences 264. Chemical Aspects of Natural and Polluted Waters

Half course (*spring term*). Tu., Th., 1-2:30. Butler.

Prereq. Physical chemistry (e.g., Chemistry 10 or Engineering Sciences 161), and some experience with biology and geology.

M-111. Analysis for Decision Making

Half course (*spring term*). O'Keeffe.

M-113. Analytic Frameworks for Policy

Half course (*fall term*). M., W., 9:30-11:00. Zeckhauser.

Prereq. Microeconomic theory, optimization, and decision analysis.

S-100. Analysis of Energy Environment and Resources

Half course. Lee.

MIT 1.83. Environmental Organic Chemistry

Nine units (*fall term*). Gschwend.

MIT 10.805J. Technology, Law and the Working Environment

Nine units (*fall term*). Ashford, Caldart.

■ EPIDEMIOLOGY

Note: Either EPI 200a or EPI 201a satisfies the school requirement of an introductory course in epidemiology. However, individual programs may require one or the other.

EPI 200a. Principles of Epidemiology

Two 2-hour sessions each week. 2.5 units. Dr. Cook.

Covers the principles and methods used in epidemiologic research in a rigorous and in-depth manner. Designed as an alternative to EPI 201a for students majoring in Epidemiology or Biostatistics, or who desire more emphasis on issues dealing with the design, analysis, and interpretation of research studies.

EPI 201a. Introduction to Epidemiology

Lectures, seminars. Two 1-hour and one 2-hour sessions each week. 2.5 units. Dr. Mueller.

Introduces the basic principles and methods of epidemiology. Lectures are complemented by seminars devoted to exercises or to the discussion of current examples of epidemiologic studies. Credit cannot be received for both this course and EPI 200a.

EPI 203b. Cohort Studies

Lectures, discussions. Two 2-hour sessions each week. 2.5 units. Dr. A. Walker.

Examines common problems in the design, analysis, and interpretation of cohort studies. Problems of exposure and disease definition, time dependent effects, confounding, and misclassification are considered in the light of data sources typically available. Relevant statistical methods are introduced but developed in detail only insofar as they affect study design. Prereq. EPI 200a and BIO 200ab (may be taken concurrently), or permission of the instructor.

EPI 204c. Case-Control Studies

Lectures, discussions. Two 2-hour sessions each week. 2.5 units. Dr. A. Walker.

Extends the discussions initiated in EPI 203b to studies in which information on the population at risk is derived from sample-based data. Implications of case and control selection procedures are discussed in detail, as are the application in case control studies of the concepts and analytic procedures developed for cohort studies.

Prereq. EPI 203b.

EPI 205cd. Practice of Epidemiology

Tutorials, seminars. Tutorial sessions during "c" period; one 2-hour seminar each week during "d" period. 2.5 units. Dr. Willett, Dr. Stampfer, Dr. MacMahon.

The seminars consist of student presentations of plans for collection and analysis of epidemiologic data, with discussion by students and faculty. Preparatory work is done under tutorial arrangements with

members of the faculty. The emphasis will be on conceptual issues and not on execution.

Prereq. EPI 200a or permission of the instructor. Enrollment limited to 16 students.

EPI 206b. Clinical Epidemiology

Not given 1988–89.

Lectures, discussions. *Two 2-hour sessions each week. 2.5 units.* Dr. Hsieh, Dr. Lee. Provides a survey of the principles and methodologies of the emerging field of clinical epidemiology for prospective investigators. Sessions combine lectures and reviews by students of recent articles to critique potential approaches to broad classes of problems confronted by clinical investigators, including assessing test performance, estimating prognosis, evaluating therapies, and developing decision rules. Prereq. EPI 200a or EPI 201a, BIO 200ab or BIO 201ab (may be taken concurrently).

EPI 207a. Readings in Theoretical Epidemiology

Not given 1988–89.

Lectures, discussions. *Two 2-hour sessions each week. 2.5 units.* Dr. Hsieh, Dr. Cook. Reviews a range of both classic and current readings pertaining to methodologic topics in epidemiology. Topics include options in study design (subject selection, matching), confounding (definition and control), modeling (model selection, co-linearity, validity, and efficiency considerations), and selected analytic methods (exposure-response relation assessment, attributable fraction estimates). Background materials on each topic are summarized, followed by a student-led discussion.

Prereq. Permission of instructor.

EPI 208s. Epidemiologic Research in Clinical Effectiveness

Lectures, discussions. *Five 1½-hour sessions each week for seven weeks. 5 units.* Dr. Cook, Dr. L. Goldman (Harvard Medical School).

Covers the basic concepts and methods needed for traditional and clinical epidemiologic research through a series of lectures, exercises, critiques of published manuscripts, and presentations by guest speakers. Emphasis is placed on applications to clinical research. Participants are required to make a formal presentation of a study design that addresses a specific clinical problem for discussion by the faculty and fellow students.

Prereq. Acceptance into Program in Clinical Effectiveness and permission of instructor.

EPI 212d. Epidemiology of Cardiovascular and Respiratory Disease

Lectures. *One 2-hour session each week. 1.25 units.* Dr. Stampfer.

Reviews the epidemiology of the chronic cardiovascular and respiratory diseases. Demographic distribution and time trends of these diseases are presented, and known risk factors are discussed.

EPI 213c. Epidemiology of Cancer

Lectures. *One 2-hour session each week. 1.25 units.* Dr. Mueller.

Reviews basic concepts and issues central to cancer epidemiology. Considers the descriptive epidemiology of cancer and discusses the implications of the biology of cancer for identification of risk factors. Examines the role of smoking, radiation, nutrition, and viruses. Each student prepares a review of the epidemiology of a specific cancer site.

Prereq. EPI 200a or EPI 201a.

EPI 214d. Epidemiologic Analysis of Outbreaks of Infectious Disease

Lectures. *One 2-hour session each week. 1.25 units.* Dr. Jonathan Freeman, Dr. Richard Platt, Dr. E. H. Kass (Harvard Medical School).

Discusses the use of epidemiologic methods in analyzing episodes of infectious disease. Various types of outbreaks and various methods of analysis are illustrated. Literature review and practical methodology are stressed.

EPI-ESP 215cd. Case Studies in Environmental and Occupational Epidemiology

Lectures, seminars. *One 2-hour session each week. 2.5 units.* Dr. Monson, Dr. Robins, Dr. Dockery.

This course has three objectives: (1) to review methods used in evaluating the health effects of physical and chemical agents in the environment, (2) to review available evidence on the health effects of such exposures, and (3) to consider policy questions raised by the scientific evidence. Includes lectures on methodology, seminars on the review and criticism of current literature, and presentations by outside experts on the evaluation and impact of epidemiologic data.

Prereq. EPI 200a or EPI 201a, BIO 200ab or BIO 201ab.

NUT-EPI 216ab. Nutritional Epidemiology

Lectures. *One 2-hour session each week. 2.5 units.* Dr. Willett, Mrs. Witschi. (Course described under Nutrition.)

EPI 217b. Disease Definition and Methods in Psychiatric Epidemiology

Lectures. *One 3-hour session each week. 2.5 units.* Dr. Tsuang.

Presents the application of basic epidemiologic concepts and methods in psychiatric research. Topics include reliability, validity, analytic methods such as screening, use of case control vs. cohort designs, and use of experimentation vs. quasi-experimentation, and estimates of morbidity and mortality, as they specifically relate to psychiatric research.

Prereq. EPI 200a or EPI 201a, BIO 200ab or BIO 201ab.

EPI 218c. Readings and Risk Factors in Psychiatric Epidemiology

Lectures. *One 3-hour session each week. 2.5 units.* Dr. Tsuang.

Covers a range of readings from the early classics to recent work on the occurrence and distribution of psychiatric illnesses. Topics include case identification and classification, treated vs. true rates, early classics in psychiatric epidemiology, effects of treatment, effects of risk factors on true and treated rates.

Prereq. EPI 200a or EPI 201a, BIO 200ab or BIO 201ab; EPI 217b recommended.

EPI 219d. Assessment Methods in Psychiatric Epidemiology

Lectures, seminars, outside practicum involving interviews. *One 2-hour session each week. 2-4 hours practicum each week. 2.5 units.* Dr. Murphy.

Focuses on interview schedules designed to identify psychiatric disorders and to provide diagnoses. Topics include the history of such instruments as well as their construction, reliability, validity, and appropriateness for different kinds of studies. Practical experience in administering and analyzing the responses to such interviews plays a central role in the course. Prereq. EPI 217b, EPI 218c.

EPI 220cd. Readings in the History of Epidemiology (FAS History of Science 292r)

To be given 1988–89; offered alternate years.

Seminars. *One 2-hour session in Cambridge and one 1-hour session at HSPH each week. 5 units.* Dr. Rosenkrantz, Dr. Brandt.

Focuses on the history of the classic texts in modern epidemiology as they have reflected changing views of the etiology of disease. Emphasizes the analysis of primary documents and their impact on medicine and public health. Each student completes a research project and writes it up in the format appropriate to a professional journal. Students are expected to have adequate preparation in the quantitative social sciences.

EPI 221b. Pharmacoepidemiology

Not given 1988–89; offered alternate years.

Lectures. *One 2-hour session each week. 1.25 units.* Dr. A. Walker, Dr. Platt (Harvard Medical School).

Issues related to the discovery and quantification of drug-related illness will be covered in case studies of historically important examples and through presentation of methods currently in use for the formal collection of new data.

EPI 222d. Diabetes Mellitus and Its Complications: Epidemiologic and Genetic Approaches

Lectures. *One 2-hour session per week. 1.25 units.* Dr. Krolewski.

Uses the pathophysiology and descriptive epidemiology of diabetes to illustrate the generation of etiologic hypotheses. Genetic models are introduced together with exam-

ples of gene/environment interactions. Continuing with the descriptive epidemiology of the late complications of diabetes, probabilistic models of the natural history of a disease are demonstrated. This is integrated around the goal of optimizing a medical care model for preventing late complications.

Prereq. EPI 200a or EPI 201a and permission of the instructor.

MCH-EPI 223b. Childhood Mental Disorders: Public Health Perspectives

Lectures, seminars. *Two 2-hour sessions each week. 2.5 units.* Dr. Deykin, Dr. Rauh.

(Course described under Maternal and Child Health.)

EPI-TPH 224d. Field Methods for Developing Countries: Epidemiology, Surveys, Program Evaluation

Two 2-hour sessions each week. 2.5 units. Members of the Department, Guest Lecturers.

Presents principles and methods for performing research in third-world field settings. Although these topics are germane for industrialized nations, readings and presentations focus exclusively on practical versus theoretical issues in international health. Matters of primary importance include threats to valid inference, program planning, survey construction, sampling methods (cluster sampling, LQAS, simple random sampling), anthropometry, dietary measures, training, data management, program evaluation design, and cost-effectiveness analyses.

ESP-EPI 235ab. Scientific Basis of Occupational Health Regulations

Seminars. *Two 2-hour sessions each week. 5 units.* Dr. Eisen, Dr. Robins, Dr. Kriebel.

(Course described under Environmental Science and Physiology.)

HPM-EPI 237d. The AIDS Epidemic: Legal and Ethical Analysis

Lectures, case studies. *One 2-hour session each week. 1.25 units.* Dr. Curran, Dr. Mueller.

(Course described under Health Policy and Management.)

EPI 300abcde. Tutorial Programs

Time and credit to be arranged.

Students may participate in departmental research in close association with a staff member. Time and credit are to be arranged with the chairman of the department.

EPI 350. Research

In selecting topics for research in doctoral programs, students should consider the fields in which members of the department are currently working. These include:

Neoplastic Disease

Dr. MacMahon, Dr. Hsieh, Dr. Maclure, Dr. Monson, Dr. Mueller.

Cardiovascular Disease
Dr. Stampfer.

Environmental Epidemiology
Dr. Monson.

Occupational Epidemiology
Dr. Monson, Dr. Kriebel.

Epidemiologic Methods
Dr. A. Walker, Dr. Hsieh.

Nutritional Epidemiology
Dr. Willett.

Virus-Associated Chronic Disease/AIDS
Dr. Mueller.

Biochemical Epidemiology
Dr. Maclure.

Psychiatric Epidemiology
Dr. Tsuang, Dr. Murphy.

■ HEALTH POLICY AND MANAGEMENT

HPM-BIO 203b, 203c, 203d. Statistical Methods for Health Policy and Management (Module I, II, III)

Lectures. *Three 2-hour sessions each week. 2.5 units each period.* Dr. Testa, Dr. DeGruttola.

Introduces students to probability and statistics, emphasizing their application in a variety of health policy and management contexts. Goals include establishing an awareness of basic statistical reasoning and recognition of common difficulties in application. The MINITAB package is used throughout.

Module I(b): Topics include distributions, data display, conditional probability, confidence intervals, hypothesis testing, testing means and proportions, and p-value. **Module II(c):** Topics include representative sampling, power, study design, sample size determinations, clinical trials, contingency tables, life tables, goodness-of-fit tests, rate adjustment, non-parametric methods, and analysis of categorical data.

Module III(d): Topics include correlation, simple linear regression, analysis of variance, multiple regression, discriminant analysis, and forecasting.

All three modules are required for students in the two-year Health Policy and Management Program and in the management and policy curricula of the one-year Health Services Administration Programs.

Sections are graded separately.

May not be taken for credit by students who previously have taken BIO 200ab or BIO 201ab. If substituted for BIO 200ab or BIO 201ab, all three modules must be taken.

Prereq. One college-level course in mathematics.

Enrollment of students not in the Department of Health Policy and Management subject to approval of the instructors.

HPM 205ab. Economic Analysis for Public Health

Lectures, discussions. *Two 1½-hour sessions each week. 5 units.* Dr. Hemenway. Provides an introduction to the basic principles of economics and economic analysis, particularly as they apply in the public health field. A systematic introduction to microeconomic theory includes the determinants of supply and demand, the theory of markets, and the concept of economic efficiency. Specific topics in health care economics include demand for health care, insurance, and the market for physician services.

May not be taken for credit by students enrolled in the two-year Health Policy and Management Program or by students who previously have taken HPM 206ab.

HPM 206ab. Economic Analysis

Lectures, seminars. *Two 2-hour sessions each week. 5 units.* Dr. Hemenway. Designed to bring students to an intermediate-level understanding of economic theory. Emphasizes the uses and limitations of the microeconomic approach.

Required for students in the two-year Health Policy and Management Program and is the first course in the policy sequence. May be taken for credit by students who previously have taken HPM 205ab only with permission of the instructor.

HPM 207d. Economics of Health Policy
Not given 1988-89.

Lectures, discussions. *Two 1½-hour sessions each week. 2.5 units.* Members of the Department.

Teaches students to use economic concepts and methods to analyze health policy issues. Applies analytical techniques to dissect complex policy problems and show what insights can be gained. Skills in using several analytical tools are developed, including economic modeling, systematic analysis, econometrics, and simulation. Health policy topics examined using these tools include national health insurance, reimbursement of hospitals and doctors, pro-competition, and facility and manpower planning. Course especially appropriate for students interested in policy analysis in the public or private sector.

Prereq. One semester each of statistics and microeconomics.

HPM 208cd. Health Care Regulation and Planning

Two 2-hour sessions each week. 5 units. Dr. Thorpe.

Examines the regulation and reimbursement of health care institutions and providers. Specific topics include rate regulation of hospitals and long term care facilities and physician fees, regulatory efforts to improve the quality of care, and access to care by the indigent. Attention is also given to efforts to limit capital spending and the general role of health planning.

Focus is on the process of regulatory change, the goals of design of regulatory and planning programs, and their intended and unintended impacts.
Prereq. HPM 206ab or equivalent; HPM-BIO 203d or permission of instructor.

HPM 209ab. Public Health Law and Human Rights

(Formerly HPM-MCH 252ab)

Lectures. *Two 2-hour sessions each week. 5 units.* Dr. Curran, Mr. Gostin.

Provides an introduction to the US legal system as it affects health care. Emphasizes concepts of law governing public health programs and distinguishing between legal and moral rights and between legal and policy issues. Among topics considered are methods of regulating health, safety, and competition; rights to medical care; rights of medical patients, the mentally ill, children, and research subjects; due process; equal protection; resource allocation; and problems of balancing personal rights and community protection.

Auditing and convenience attendance not permitted.

HPM 210c. Medical Malpractice and Risk Management

(Formerly HPM 254c)

Lectures. *Two 2-hour sessions each week. 2.5 units.* Dr. Curran, Mr. Moulton.

Focuses upon the development, implementation, and evaluation of risk management programs and legislative reforms in patient compensation plans. Attention is given to medical and hospital malpractice experience, key legal decisions in the area, and legislative reform movements setting up arbitration, screening panels, tort-law changes, no-fault mechanisms, etc. The interrelationship of quality of care standards and quality assurance to malpractice vulnerability and risk management programs is a primary focus of attention.

HPM 211cd. Advanced Seminar in Law and Public Health

(Formerly ID 215cd)

Lectures, discussions, student presentations. *One 3-hour session each week. 5 units.* Dr. Curran, Guest Lecturers.

Provides an opportunity for law-trained students in the Public Health for Lawyers curriculum option and other qualified students to work together and exchange experiences in application of legal issues to current public health problems. The seminar is the focus for a legal research paper on a topic of health law mutually determined by student and instructor. Legal issues concentrate on matters of importance in representing health organizations in governmental and private sectors. Enrollment subject to approval of the instructor.

HPM 214d. Meta-Analysis of Clinical Trials and Their Impact on Medical Efficiency

Seminars, tutorials. *Two 1½-hour sessions each week. 2.5 units, plus additional units for tutorial.* Dr. Chalmers, Members of the Faculty.

Designed as a follow-up to BIO 214b. Concerned with the place of clinical trials in practice of preventive, diagnostic, and therapeutic medicine. Students learn to evaluate, conduct, coordinate, and combine clinical trials.

Related tutorials are conducted throughout the year. Students conduct meta-analysis in a field of their choice. Guidance and collaboration are given in searching literature for RCTs on diagnostic evaluations, gathering and analyzing data, and preparing abstracts for presentation at national meetings and publication of manuscripts in peer-review journals.

Prereq. An interest in the application of the scientific method to the prevention, diagnosis, and treatment of disease.

HPM 220ab/220cd. Administrative Systems

Lectures, seminars. *Three 2-hour sessions each week. 5 units each term.* Dr. Arnold, Members of the Department.

Examines issues related to managing health care organizations and develops skills in a variety of functional areas, including organizational theory, institutional strategy, leadership, change and conflict, financial accounting and analysis, cost accounting, operations management, marketing, and management control systems. Classes rely principally on the case method of instruction.

Required for students in the two-year Health Policy and Management Program. HPM 220ab may be taken separately by other students, but only HPM 220ab/220cd is an acceptable substitute for HPM 221ab. HPM 220cd may not be taken separately. May be taken for credit by students who previously have taken HPM 221ab or HPM 222ab.

HPM 221ab. Managing Health Delivery Organizations

Lectures, seminars. *Two 2-hour sessions each week. 5 units.* Dr. Roberts.

Introduces the management of health delivery organizations in industrialized countries. Topics include organizational issues, financial management, cost accounting, management control systems, and institutional strategy. Combines cases, lectures, and speaker presentations, supplemented by topical readings, as a vehicle for analyzing management problems and evaluating alternative solutions. Relevant managerial concepts and theories are introduced.

Either HPM 221ab, HPM 222ab, or HPM 220ab/220cd is required for students in the MPH program. May not be taken for credit by students enrolled in the two-year Health Policy and Management Program or by students who previously have taken either HPM 222ab or HPM 220ab/220cd.

HPM 222ab. Management in Public Health in Developing Countries

Case discussions, lectures. *Two 2-hour sessions each week. 5 units.* Dr. Reich.

Introduces major issues and methods for understanding management in public health in developing countries. Examines key concepts of management, including organizational purpose and strategy, human resources development, organizational operations, budget and financial control systems, management information systems, and the external environment. Considers management in international agencies, the role of international consultants, and host country relations with aid agencies. Uses cases and readings appropriate to developing country context. Either HPM 221ab, HPM 222ab, or HPM 220ab/220cd is required for students in the MPH program. May be taken for credit by students enrolled in the two-year Health Policy and Management Program or by students who have previously taken either HPM 221ab or HPM 220ab/220cd only with the permission of the instructor.

HPM 229cd. Legal and Management Aspects of Health Care in the Workplace

One 3-hour session each week. 2.5 units. Dr. Curran, Mr. Moseley.

Introduces the full range of new health care issues confronting US employers: employee disabilities, alcohol and drug abuse, AIDS, fetal protection, medical screening, pregnancy and maternity benefits, job stress, smoking, Employee Assistance Programs (EAPs), health promotion and employee wellness, and health care cost containment. Examines legal implications of these issues and suggests specific, practical policies and procedures for managing these issues to minimize employer cost and maximize employee health and productivity.

HPM 231cd. Strategic Planning and Organization Design

Case discussions, lectures. *Two 2-hour sessions each week. 5 units.* Dr. Sapienza.

Includes two conceptually distinct portions: industry/environmental analysis and organizational design. The first portion provides the foundation and tools for determining strategy. Once strategy is defined, the manager's next task is to design the organization to achieve that strategy.

Prereq. HPM 220ab and microeconomics, or permission of the instructor.

HPM 233b. Health Care Marketing Applications

Seminars, case studies, lectures. *Two 2-hour sessions each week. 2.5 units.* Dr. Barrett, Ms. MacCracken.

Examines various marketing applications in domestic health services, international underdeveloped areas, and social marketing contexts. Specific marketing techniques are addressed within a strategy framework.

Prereq. Previous coursework in marketing (i.e., HPM 220ab/220cd or equivalent) and permission of the instructor.

HPM 236cd. Management in the Health Care Industry (HBS 1344)

Lectures. *Two 1½-hour sessions each week. 5 units.* Dr. Herzlinger, Dr. Rhea (Harvard Business School), Dr. Kane.

Focuses on the management issues in health care institutions including those that deliver health care (hospitals and free-standing facilities); that insure the provision of health care; that supply drugs, equipment, MIS services, and hospital supplies; that provide research in bio-technology; that provide capital; and that regulate the industry. Explores the strategic choices offered by the newly competitive structure of the industry and the managerial policies needed to execute these choices.

Prereq. HPM 220ab/220cd or equivalent, by permission of the instructor. It is strongly recommended that students take HBS 1303, *Analysis of Corporate Financial Reports*.

HPM-EPI 237d. The AIDS Epidemic: Legal and Ethical Analysis

Lectures, case studies. *One 2-hour session each week. 1.25 units.* Dr. Curran, Dr. Mueller.

Uses the case method to analyze legislative and other legal developments in the United States and internationally that are designed to deal with the worldwide AIDS epidemic. Ethical problems including personal rights, confidentiality, and discrimination are also examined. Attention is given to current epidemiological factors impacting upon public health law and regulatory programs such as voluntary and mandatory screening, disease reporting, case finding, and contact tracing.

HPM 238b. Managing Management Information Systems

Lectures, discussions. *Two 2-hour sessions each week. 2.5 units.* Dr. Barrett, Ms. Gougeon.

Examines issues relating to effective management of computer-based management information systems. Although some technological issues are addressed on occasion, the principal focus of the course is on topics of systems analysis and design, MIS strategies, and organizational behavior, rather than technology. Uses case method instruction, supplemented by topical readings to focus on the role of a manager in assuring the success of an organization's MIS effort. Includes some international as well as US materials.

Prereq. HPM 220ab/220cd, HPM 221ab or equivalent.

HPM 239a. Financial Analysis in Health Care

Lectures, discussions. *Two 2-hour sessions each week. 2.5 units.* Dr. Kane.

Provides the opportunity to develop advanced skills in financial accounting and analysis of financial reports. Covers fund accounting, accounting for inflation, analysis of financial statements, and funds flow. Cases draw on both hospitals and other nonprofit organizations.

Prereq. HPM 220ab/220cd or equivalent.

HPM 240a. Toward an Agenda for Public Health

Lectures, discussions. *Two 2-hour sessions each week. 2.5 units.* Dr. Roberts.

Provides an overview of the problems of setting priorities in public health. Examines the burden of illness in both advanced and developing societies and the causal role of environmental, economic, and behavioral factors. Discusses ways to measure the burden of ill health and alternative assumptions and implications. Examines ethical positions on how resources should be allocated, and the view of man and society they presume.

Required for students in the Health Policy and Management Department.

HPM 241b. Health Care Delivery in the US: History and Sociology

Lectures, discussions. *One 3-hour session each week. 2.5 units.* Dr. Plough.

Offers an introduction to contrasting sociological and historical accounts of the US health care sector. Historical materials and contemporary case studies are used to analyze the roles of providers, patients, and other political, cultural, and social factors in determining the current objectives and institutional arrangements in this sector. The central role of physicians and "medical science" in health care is emphasized, and its implications for institutional reform explored.

Prereq. HPM 240a.

HPM 242c. The Role of Government in the US Health Care System: Political Analysis

Lectures, discussions. *Two 2-hour sessions each week. 2.5 units.* Dr. P. Feldman.

Introduces political analysis, using several models to examine the development and implementation of policies and programs

affecting the US health care system. Topics include legislative politics, bureaucratic politics, and intergovernmental relations, as well as government's role in financing, delivering, and regulating health services. Prereq. HPM 205ab, HPM 206ab, or equivalent, by permission of the instructor.

HPM 243d. Economic Analysis of the US Health Care Delivery System

Lectures, discussions. *Two 2-hour sessions each week. 2.5 units.* Dr. Hsiao.

Introduces health economics, using economic analysis to examine major health care delivery issues and the development of policies and programs designed to address them. Topics include health care finance, health care access and utilization, the supply of and demand for medical care services, health care regulation, and competition and national health plans.

Prereq. HPM 205ab, HPM 206ab, or equivalent, by permission of the instructor.

HPM 246c. The Allocation of Health Resources

Seminars. *One 3-hour session each week. 2.5 units.* Dr. Hiatt.

Considers the background of the problem of allocating health resources in the US and considers possible responses to its challenges. Discusses the stress placed on health resources by increasing medical capabilities, needs, and demands, and the disparity between what we can do and what we can afford to do.

Prereq. HPM 240a and permission of the instructor.



Malcolm Bryant (left), a 1987 graduate of HSPH and currently a Public Health Management Fellow at the Harvard Institute for International Development, describes HIID's health projects in Africa to student Edgar Monterroso.

HPM 247d. Injuries and Public Policy
Seminars, case studies, lectures. *One 3-hour session each week. 2.5 units.* Dr. Hlemenway.

Introduces students to the problem of injury, from a social science perspective. Discusses and analyzes approaches to understanding the problem, and policies to mitigate the consequences of both accidental and intentional injury. Specific categories of injury, such as fires, drowning, and motor vehicle collisions are examined in detail.

Prereq. HPM 240a and HPM 205ab or HPM 206ab, or equivalent preparation.

HPM 248cd. Business and Labor in the Health Care System

Not given 1988-89.

Seminars. *One 3-hour session each week. 2.5 units.* Dr. Blendon.

Examines changes in the health care system affecting doctors, hospitals, insurers, and government, through the perspective of the enhanced roles of business and labor organizations. Considers a series of topics, including the development of employment-based health insurance, current problems of access to health care, health care for retirees, and pending legislation in Massachusetts and the Congress.

HPM 255d. Reimbursement Systems

Seminars. *Two 1½-hour sessions each week. 2.5 units.* Dr. Kanc.

Examines issues related to the general theme of third-party reimbursement for health care institutions. The principal focus is on hospitals. Issues include cost containment efforts, hospital perspectives, and the role of incentives. Some specific systems are examined in detail in order to assess the feasibility of certain techniques and to address questions of overall reimbursement system design.

Prereq. Introductory courses in financial and cost accounting recommended.

HPM 256c, 256d. Financing Health Care (Module I, II)

Not given 1988-89.

Lectures, case studies. *Two 2-hour sessions each week. 5 units.* Dr. Hsiao.

Introduces the major public and private approaches to financing health care. Analyzes the economic considerations in financing: equity, efficiency, and stability. Evaluates impact of financing on access, risk pooling, cost inflation, and technology diffusion. Module I (HPM 256c) analyzes the stages of economic development and health care financing. Module II (HPM 256d) focuses on financing methods in developed nations. Each module may be taken separately.

Prereq. HPM 205ab or HPM 206ab and permission of the instructor.

HPM 257c. Physician Performance
Seminar. *Two 2-hour sessions each week. 2.5 units.* Dr. Calkins.

Examines factors influencing physician practices and the quality of physician services. Issues discussed include the role of education, specialization, experience, organizational setting, financial incentives, and malpractice. Considers strategies for changing physician practices with respect to diagnostic testing, treatment, and patient education. Experience in medical care delivery an advantage, but not required.

Course is followed by the optional sequel HPM 258d.

HPM 258d. Evaluation of Quality of Health Care

Lectures, discussions. *Two 2-hour sessions each week. 2.5 units.* Dr. Palmer, Visiting Lecturers.

Examines issues in defining "quality in health care" and the choice of methods for assessing and improving quality of health care. Recent research is reviewed and operating programs, including the PRO program, are analyzed. Includes a workshop on designing a medical care evaluation in an ambulatory care facility. Visiting lecturers describe quality of care evaluation programs in hospital and laboratory settings.

Additional sequel to HPM 210c and HPM 257c.

HPM 262cd. Health Planning and Policy for Developing Countries

Lectures, seminars. *Two 2-hour sessions each week.*

Laboratory. *One 1-hour session each week (optional). 5 units.* Dr. Shepard.

Deals with skills needed for health planning through lectures, problems, and case studies. Strong emphasis is placed on the economic analysis of health issues in developing countries. Concepts and techniques of cost-effectiveness analysis, recurrent cost analysis, and monitoring of the delivery of health services are taught, applied to health care programs, and practiced with examples. Class is divided into groups which use these techniques to analyze a planning problem and report their findings through presentations and a memorandum.

ID 209a or experience in developing countries is recommended, but not required. A background in economics is not required.

POP-HPM 263c. Case Studies in Design and Management of Population and Community Health Programs

Case discussions, seminars. *Two 2-hour sessions each week. 2.5 units.* Dr. Berggren, Dr. Strachan.

(Course described under Population Sciences.)

HPM 264b. Operations Management
Lectures, discussions. *Two 2-hour sessions each week. 2.5 units.* Dr. Shepard.

Introduces, applies, and critiques the usefulness of quantitative techniques for designing and managing health programs. Important techniques (trend forecasting, critical path method, linear programming, queuing, and modeling) are developed through readings, cases, exercises, and use of relevant personal computer software (e.g., project management, spreadsheet, and simulation). Working in groups of two, students apply one of these techniques to a project of their choice.

Prereq. At least one course in biostatistics, or permission of the instructor.

HPM 265d. Management Information Systems for Third World Health Systems

Lectures, discussion, case studies. *Two 2-hour sessions each week. 2.5 units.* Dr. Henn.

Explores the theoretical and practical concepts of information systems design. The course begins with basic concepts of management, information theory, and systems analysis and proceeds to develop a general understanding of the design considerations of a MIS. Focus is upon both public and private sector systems and on the "human side" of MIS implementation. Emphasis is on MIS development for use by Third World health sector managers. Primary course instructor is Joel Lamstein, CEO of John Snow, Inc.

HPM 267d. Political Economy of International Health Policy

Seminars, case discussions. *Two 2-hour sessions each week. 2.5 units.* Dr. Reich.

Examines critical health issues of developing countries in the larger international context of politics and economics. Explores how the relationships between developed countries and developing countries affect the management of health problems and policy. Students are introduced to two contrasting perspectives on development and health: modernization theory and dependency theory. Six case studies are discussed in class to illustrate the constraints and the opportunities created for health professionals by the international complexities of domestic health problems.

HPM 268c. Comparative Health Policy in Industrialized Countries

Not given 1988-99.

Seminars. *One 3-hour session each week. 2.5 units.* Dr. Reich.

Uses comparative analysis to identify similarities and differences among health policies of industrialized countries, to seek explanations for similarities and differences, and to explore social, economic, and health consequences of different policies. Examines various approaches to comparative study. The course is organized around issues rather than countries; the issues include ideology, structure, financing, indicators of effectiveness, environmental policy, and pharmaceutical policy.

HPM 270c. Issues in Mental Health Policy

Seminars, discussions. *One 3-hour session each week. 2.5 units.* Dr. Shore, Dr. Dorwart.

Reviews the historical development and current status of policy issues relevant to mental health and mental illness. Detailed attention is given to the role of government and to identifying areas where further research is needed.

HPM 274abcd. Dental Care Administration Research Seminar (HDS DCA 222)

Lectures, seminars. *One 3-hour session each week. 5 units.* Dr. Douglass. The fall term concentrates on the research methods of current national studies of the need, supply, demand, and cost of dental care. Policy documents of the ADA, IOM, OTA, Research Triangle Institute, RAND Corp., and the NCHS are studied. Research designs and data collection methods are reviewed. The spring term emphasizes the research work of faculty and students on relevant dental care policy and management subjects. Grade is based upon participation and the defense of a current research project.

HPM 275ab. Dental Public Health and the Dental Care Delivery System

Seminars, case studies, lectures. *One 2-hour session each week. 2.5 units.* Dr. Antczak, Members of the Department. Reviews basic concepts in dental public health and the dental care delivery systems in the US and other countries. Examines issues of utilization of services, need versus demand for dental care, methods of quality assurance, and the role of government agencies in the provision and regulation of dental care. The effects of alternative methods of financing dental care on utilization and provider incentives will also be discussed.

HPM 276cd. Oral Diseases and the Evaluation of Dental Care

Seminars. *One 2-hour session each week. 2.5 units.* Dr. Antczak. Examines basic concepts in the epidemiology of oral diseases and reviews changes in disease prevalence. Discusses the measurement of oral health status and the translation of oral health status into treatment needs for planning purposes. Methods of evaluating dental care are also covered, including clinical decision making, research design, quality assessment of experimental evidence, and meta-analysis.

HPM 278s. Clinical Decision Analysis and Public Policy

Five 1a-hour sessions each week for eight weeks. 5 units. Dr. Hiatt; Dr. Komaroff, Dr. Mulley, Dr. Epstein (Harvard Medical School). Introduces the methods and applications of decision analysis, cost-effectiveness analysis, and cost-benefit analysis in the evaluation of clinical interventions, medi-

cal technologies, and health programs. Course emphasizes applications to treatment decisions and program evaluations. In addition, this course includes introductory material on microeconomic models, priority setting, cost accounting, and the organizational and policy contexts in which analytic techniques in a clinical setting are undertaken and interpreted. Prereq. Permission of instructor.

HPM 279c. Quantitative Policy Analysis

Seminars, case studies, lectures. *Two 2-hour sessions each week. 2.5 units.* Dr. Graham. Introduces students to techniques for analyzing health problems quantitatively. Techniques include decision analysis, cost-effectiveness analysis, and benefit-cost analysis. Readings from health, safety, and environmental literature are used to illustrate the techniques and their limitations. This course or HPM-BIO 280c is required for students in the two-year Health Policy and Management Program. Course emphasizes applications to health policy, planning, and management. Prereq. HPM 205ab or HPM 206ab or equivalent.

HPM-BIO 280c. Decision Analysis for Health and Medical Practices (KSG S-176m)

Lectures, discussions. *Two 2-hour sessions each week. 2.5 units.* Dr. Weinstein. Concerns the methods and applications of decision analysis, cost-effectiveness analysis, and cost-benefit analysis in the evaluation of medical technologies and health programs. Stresses applications and limitations. Examples used to illustrate techniques include treatment decision for acute abdominal pain, coronary artery bypass surgery, cost effectiveness of pharmaceuticals, evaluation of immunization programs, and priority setting for applied biomedical research. Course emphasizes applications to medical technology assessment and health resource allocation. Prereq. BIO 200ab or BIO 201ab or HPM-BIO 203b, 203c (may be taken concurrently) or equivalent introductory course in probability and statistics. This course or HPM 279c is required for students in the two-year Health Policy and Management Program.

HPM-BIO 281d. Seminar on Clinical Decision Analysis

Seminars. *Two 2-hour sessions each week. 2.5 units.* Dr. Politser. Intended to enhance the student's ability to conduct independent analyses of medical decisions. Didactic sessions will critically review published analyses and address selected topics, such as evaluation of diagnostic tests, utility assessment, and use of computer aids. Presumes knowledge of principles of decision analysis. Prereq. HPM-BIO 280c or permission of the instructor.

HPM-BIO 282d. Cost-Effectiveness and Cost-Benefit Analysis for Health Program Evaluation

Seminars, lectures. *Two 2-hour sessions each week. 2.5 units.* Dr. Weinstein, Dr. Graham.

Topics include methods and applications of cost-effectiveness and cost-benefit analysis for health program evaluation, medical technology assessment, and environmental risk analysis; theoretical foundations; "shadow" pricing; economic valuation of life saving; choice of discount rates; cost accounting applied to economic evaluation in institutional settings; methods for assessing costs of environmental controls; distribution-sensitive measures of social benefit and cost; health status indexes; ethical issues; and modern critiques. Students prepare a written critique of a published analysis and develop an independent analysis plan of their own choice.

Prereq. HPM-BIO 280c, HPM 279c, or equivalent; HPM 205ab, HPM 206ab, or equivalent.

HPM-BIO 283b. Behavioral Decision Theory in Health

Lectures, discussions. *Two 2-hour sessions each week. 2.5 units.* Dr. Politser. Examines selected topics in the psychological study of how humans make decisions, with applications to medical decision making, health policy, health care management, and environmental decision making; subjective evaluation of probability and uncertainty; risk perception; framing effects; choice behavior; deviations from normative models; policy methods; the nature of human expertise; sources of variation in medical practices; and behavioral factors in the utilization and diffusion of technologies.

HPM-BIO 284a. Topics in Decision Theory

Lectures, seminars. *One 3-hour session each week. 2.5 units.* Dr. Politser. Presents selected topics in the theory and methods that underlie decision and risk analysis, including axiomatic foundations of expected utility theory, statistical decision theory, ROC analysis and diagnostic technology assessment, multiattribute utility theory, criticisms, alternatives, and research frontiers. Prereq. HPM 280c, HPM 279c, or equivalent; at least one semester of biostatistics beyond the introductory level; knowledge of elementary calculus and matrix algebra. Permission of the instructor required.

HPM 290ab, 290cd. Applied Research Seminar

Seminars. *One 2-hour session each week. Field work. One day each week. 5 units each term.* Dr. Blendon, Dr. Barrett. Teaches students to apply analytic and managerial methods to concrete problems. Each student defines and proposes solutions to an important problem confronting an institutional sponsor. Students learn

research methods and problem-solving techniques during the "a" period while developing project contracts with sponsors. In subsequent seminar meetings, students, sponsors, and faculty advisers present and discuss study methods and findings. Students also meet individually with seminar faculty and designated faculty research advisers. Students prepare a "problem/methods" paper during the first semester and final oral and written reports are due at the end of the year. Required for students in the two-year Health Policy and Management Program. Prereq. Completion of the first year of the Health Policy and Management Program.

HPM 295bc. Doctoral Seminar on Research and Health Policy

Seminar. *One 2-hour session each week. 2.5 units.* Dr. Blendon, Dr. P. Feldman. Outlines the major research questions that relate to key issues of health policy. Reviews and critiques relevant research studies and discusses the design of research projects appropriate to specific policy questions. The seminar is not intended to explore technical statistical issues, but rather to place research and analysis in their social, institutional, and policy context. Prereq. Enrollment in the Health Policy and Management doctoral program and/or similar background and experience.

HPM 296cd. Doctoral Seminar in Health Economics

One 2-hour session each week. 2.5 units. Dr. Gertler, Dr. Hsiao. Explores frontier work in the field of health economics. The focus is on learning advanced theories and economic models useful for policy analysis, and on helping students develop dissertation and/or research topics. Students enrolled for credit are expected to present original research at the end of the semester. Prereq. Doctoral candidates or very advanced master's students (with instructor's permission); a graduate-level microeconomics course.

HPM 300abcde. Tutorials

Time and credit to be arranged. Students may make individual arrangements to do work under the guidance of a member of the department. This work may include readings or special projects.

HPM 301c. Departmental Seminar in Health Policy and Management

Lectures, seminars. *One 2-hour session each week. 1.25 units.* Dr. Blendon, Dr. Barrett, Guest Lecturers. Introduces students to prototypical policy and management questions in four areas: management of health care organizations and systems, health financing and insurance, management of health hazards, and management and evaluation of biomedical technology. Recommended for students in the first year of the two-year Health Policy and Management Program.

HPM 330e, 330f. Field Work

Time and credit to be arranged. Students are assigned to work on special projects such as group surveys, other types of field projects, or observation of and limited participation in the work of health agencies. Field assignments are made on an individual basis to meet the needs of each student insofar as possible. Work in the field is coordinated with courses in the department and is offered through the Community Health Improvement Program.

HPM 350. Research

Doctoral candidates may register for HPM 350 to undertake individual study and research.

■ MATERNAL AND CHILD HEALTH

MCH 200b. Growth and Development I
Lectures, seminars, self-instructional material. *Two 2-hour sessions each week. 2.5 units.* Dr. Valadian.

Instruction in physical growth, development, maturation, and aging is presented in programmed, self-instructional material, and by weekly lectures. Covers topics necessary for the advanced study of growth and maturation and for population growth monitoring. Also provides an understanding of assets and needs which constitute a basis for health services.

MCH 202d. Growth and Development II: Factors Affecting Growth and Development

Lectures, seminars. *One 2-hour session each week. 1.25 units.* Dr. Valadian. Explores definable influences that act on the course of physical growth and development from conception to maturity. Emphasis is placed on understanding the nature of the factor and its direct effects, as well as on how factors interrelate to produce some characteristics of mature individuals. This course also considers implications of factors for planning and providing health services and for future research.

MCH 203e. Primary Maternal and Child Health Care

Seminars, lectures, field visits. *Full-day sessions. 1.25 units.* Dr. Gardner. Introduces the student to principles of organization and administration of primary health care services for mothers and children. Concepts of primary care, neighborhood health centers, and quality assurance are presented. Seminars focus on the issues and problems presented in the field visits. The community programs selected are diverse, including neighborhood health centers, private practice, hospital primary care, and HMO. Enrollment limited to 12 students.

MCH 204ab. Content of Maternal and Child Health Programs

Seminars. *Two 2-hour sessions each week. 5 units.* Dr. Guyer. Components of health care programs for mothers and children are discussed as they vary to meet changing needs resulting from growth and maturational processes. Health programs appropriate to maternity, early and late childhood, adolescence, and youth are presented in terms of the multidisciplinary and interdisciplinary action they require. Also included are the historical and legislative background and the relationship of maternal and child health programs to social, mental health, education, and other systems; the course includes discussion of factors which shape current and future maternal and child health policies and services.

MCH 205cd. Planning, Implementation, and Evaluation of Maternal and Child Health Programs

Lectures. *One 2-hour session each week. 2.5 units.* Dr. Gardner.

Considers the organization and administration of national, state, and local health programs for mothers, infants, children, and adolescents, and services for children with handicapping conditions. Focuses on the development of skills in policy-formulation, needs assessment, planning, and evaluation of MCH programs in the US. Individual and small group projects are required.

MCH 206cd. Maternal and Child Health in Developing Countries

Seminars. *One 2-hour session each week. 2.5 units.* Dr. Valadian. Parallels MCH 205cd. Emphasizes factors which shape MCH programs in rapidly changing social and cultural environments, particularly the interactions between health, nutrition, and poverty. Studies selected programs by age periods from various areas of the world and the processes of planning, financing, implementing, and evaluating such programs in relation to other sectors. Individual or small group case study projects are required.

MCH-NUT 207cd. Nutrition in Child Growth and Development

Lectures, discussions. *One 2-hour session each week. 2.5 units.* Dr. Dwyer. Examines principles and practical problems encountered in the nutritional aspects of child growth and development. Lectures on general principles are designed to help students base their judgments on scientific evidence. Discussions deal with a variety of nutrition case studies and simulations illustrative of problems in both developing and highly industrialized countries.

MCH 208d. Rural Health Services

Seminars. *Two 2-hour sessions each week. 2.5 units.* Dr. Gardner.

Lectures and discussions focus on the special problems of rural communities affecting MCH services delivery, cultural characteristics, resources available, and innovative approaches to problems, with selected examples in rural areas. Emphasis placed on doing needs/demands assessments or community diagnosis which structure planning for the health needs in isolated communities. Topics include transportation problems, environmental health hazards, and other rural health concerns.

MCH 209c. Services for Children with Disabilities

Lectures, seminars. *Two 2-hour sessions each week. 2.5 units.* Dr. Crocker.

Provides a review of the handicapping conditions of childhood: mental retardation, physical disability, sensory and communication disorders, and emotional disturbance, as these affect development, adjustment, and family resources. The service system is analyzed with regard to health care, developmental support, education, residential options, and prevention.

MCH-BEH 210ab. An Introduction to Personality and Cognitive Development
Not given 1988-89.

Lectures, discussions. *One 2-hour session each week. 2.5 units.* Dr. D. Walker.

The basic principles of child growth and development in the cognitive and the psychosocial domains are examined in this introductory course. Special emphasis is placed on understanding the theories and research of Piaget, Freud, Erikson, and others, as well as the implications of these contributions to the planning and implementation of health and/or related social and educational services for children and youth.

MCH 211ab. Women and Health

Seminars. *One 2-hour session each week. 2.5 units.* Dr. Gardner.

Considers critical issues of health care and the common problems of women, including the changing role of women in contemporary society. These health problems are addressed in terms of their epidemiology and the impact of technology on their detection and treatment viewed from biological, medical, behavioral, and legal perspectives.

MCH 212c. Childhood Injuries:**Epidemiological Principles and Control Strategies**

Seminars, lectures. *Two 2-hour sessions each week. 2.5 units.* Dr. Guyer, Dr. Hemenway, Dr. Graham.

Introduces students to the epidemiology of childhood injuries and the development of countermeasures for prevention. Discusses methods for the study of injuries and evaluation of prevention programs. Considers specific topics including motor vehicle injuries to children as occupants and pedestrians, injuries in the home, a developmental approach to childhood injury, injuries to adolescents, violence, and suicide.

Complements material presented in HPM 247d.

MCH 213d. Obstetric Epidemiology

Lectures, seminars. *One 2-hour session each week. 1.25 units.* Dr. Sachs.

Tackles controversial issues in maternal health through techniques in epidemiology applied to obstetrics. Focuses on maternal mortality, obstetric and gynecologic morbidity, evaluation of obstetric health care, and populations at risk, such as pregnancies in women over 35. Examines the epidemiology of prematurity and current issues such as breast-feeding, home births, Caesarian sections, and fetal monitoring.

MCH 222c. Social Services for Children, Adolescents, and Families

Lectures, seminars. *Two 2-hour sessions each week. 2.5 units.* Dr. Deykin.

Presents the crucial role of social services in maintaining and promoting the health of children and their families. Beginning with a historical overview of social services in the US, the course examines current political trends which structure the content and delivery of social services, drawing comparisons with those in other countries. The social and psychological determinants of the need for social services will focus on events of public health relevance, including terminal illness in childhood, adoption/foster care, family violence, substance abuse, and pregnancy in adolescence.

MCH-EPI 223b. Childhood Mental Disorders: Public Health Perspectives

Lectures, seminars. *Two 2-hour sessions each week. 2.5 units.* Dr. Deykin, Dr. Rauh.

Examines the occurrence and known risk factors of selected mental disorders of childhood and adolescence, including autism, depression, hyperactivity, and anorexia. Emphasizes the methodologic issues of case definition, disorder classification, current diagnostic and screening instruments, and the advantages/disadvantages of available data sources. Readings include studies selected to illustrate methodologic options and usefulness for public health policy.

MCH 300abcd. Tutorials

Time and credit to be arranged.

Students at the master's level may arrange to work individually or in small groups under the guidance of a faculty member. The work may include participation in departmental research, specialized readings, field projects in a local or state health agency, or small studies to examine more in-depth topics introduced in various courses such as planning and evaluation of MCH services for children with handicapping conditions.

Tutorials are offered depending on students' interests and are limited by the amount of faculty time that is available. Arrangements must be made with individual faculty members.

MCH 330. Field Study

Field study will be arranged on an individual basis to meet the special needs of each student insofar as possible.

Additional Field Study

Students who lack sufficient previous experience are encouraged to undertake a period of field study before registration or after completion of the academic year in a program arranged by the staff of the department. No credit is allowed for such field study.

MCH 350. Research

Doctoral students are required to undertake research in maternal and child health.

■ NUTRITION**NUT 201a/201b. Principles of Nutrition**

Lectures. *Two 2-hour sessions each week. 2.5 units each period.* Dr. Storch, Members of the Department.

NUT 201a emphasizes basic concepts of nutrition, including relationships between nutrition and problems such as cancer and heart disease. NUT 201b provides a more detailed treatment of selected topics with emphasis on metabolic regulation.

NUT 201a may be taken separately, but NUT 201a (or permission of the instructor) is a prerequisite for NUT 201b.

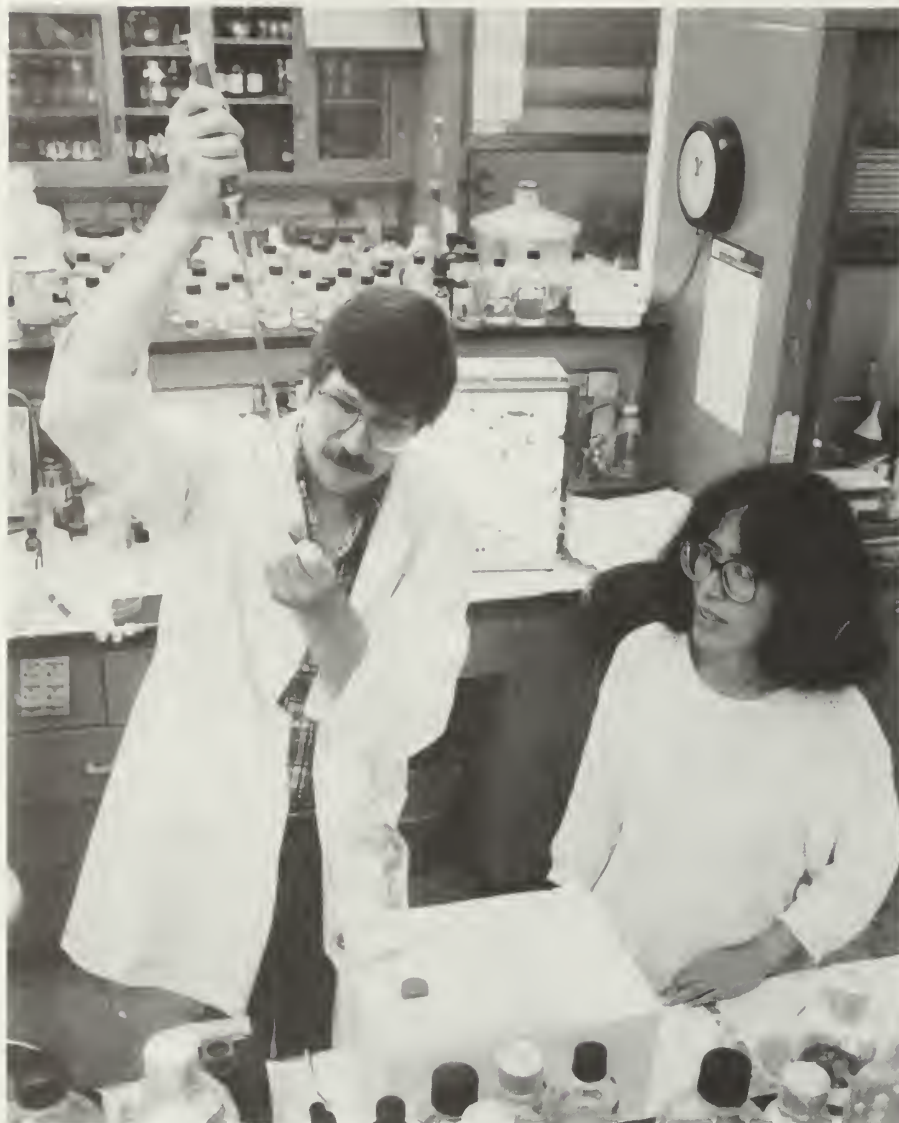
NUT 202c. Nutrition Policy and Management

Not given 1988-89.

Two 1½-hour sessions each week. 2.5 units. Dr. Herrera-Acena, Dr. Overholt.

Uses the case study approach to examine the design, planning, and implementation of food and nutrition policies, as well as the design and management of specific nutrition programs. Course content focuses on these major topics, programming for vulnerable population groups, food fortification and new foods, marketing and nutrition education, and national policies and strategies.

Prereq. NUT 201a or NUT 210ab recommended.



Dr. Hei Sook Sul, right, Assistant Professor of Biochemistry in the Department of Nutrition, works in the laboratory with her assistant, Research Fellow Dr. Joe Gauss.

NUT 204ab/204cd. Departmental Seminars

Seminars. *Two 1-hour sessions each week. 2.5 units each term.* Dr. Franceschi, Members of the Department.

Students participate in and present seminars reviewing current research and publications related to nutrition in addition to attending advanced seminars presented by faculty and guest speakers. Beginning students learn skills required for oral presentations. Topics include both basic research and applied areas of nutrition.

NUT 205cd. Biochemistry and Physiology of Nutrition

Not given 1988-89; offered alternate years. Lectures. *Two 2-hour sessions each week. 5 units.* Dr. Owen, Members of the Department.

The biochemistry and physiology of carbohydrates, fat, protein, vitamins, and

minerals are integrated from the nutritional perspective. Course provides an in-depth analysis for students with a major interest in nutritional biochemistry.

Prereq. Course in biochemistry and permission of the instructors.

MCH-NUT 207cd. Nutrition in Child Growth and Development

Lectures, discussions. *One 2-hour session each week. 2.5 units.* Dr. Dwyer.

(Course described under Maternal and Child Health.)

NUT 208cd. Nutritional Aspects of Human Disease

Lectures, case presentations, discussions. *One 2-hour session each week. 2.5 units.* Dr. Herrera-Acena, Mrs. Witschi.

Reviews the role of diet in the causation and management of clinical obesity, diabetes mellitus, coronary artery disease,

anemia, liver disease, alcoholism, gastrointestinal disorders, and renal disease. Early detection and prevention of these nutrition-related disorders are considered.

NUT 209cd. Food Science and Nutrition

Lectures, discussions. *One 2-hour session each week. 2.5 units.* Mrs. Witschi, Dr. Samonds, Members of the Department. Deals with nutrition in terms of the foods which supply mankind's nutrient needs, their composition and physical properties, and the positive and negative effects on nutrient qualities of food of genetic manipulation, agricultural practice, processing, storage, and cooking. The historical development of food technology, including methods of preservation and sanitation, is related to current methods employed in both developing and industrialized countries.

NUT 210ab. Nutrition Problems of Less-Developed Countries

Lectures, discussions. *One 2-hour session each week. 2.5 units.* Dr. Herrera-Acena. The nutrition problems of less-developed countries are discussed in the context of basic human needs. The ecology and the biological and behavioral consequences of malnutrition are reviewed in detail. Special emphasis on issues in human biology relevant to the formulation of nutrition policy and programs.

NUT 214ab/214cd. Research Techniques in Nutritional Biochemistry

Lectures. *One 1-hour session each week. Laboratory. Fifteen hours minimum each week. 5 units each term.* Dr. Storch, Members of the Program in Nutritional Biochemistry.

Students rotate through the laboratories (one each period) of faculty members in the Nutritional Biochemistry Program in order to learn current techniques applied to nutritional, cellular, and biochemical research. Weekly lectures emphasize the theory behind the instrumentation utilized in the laboratory. Oral and written presentations of research accomplished by the student to the Nutrition faculty as required.

Generally limited to students in the Department of Nutrition.

NUT-EPI 216ab. Nutritional Epidemiology

Lectures. *One 2-hour session each week. 2.5 units.* Dr. Willett, Mrs. Witschi.

Reviews methods for assessing dietary intakes of populations and individuals. Students gain experience in the actual collection, analysis (including conversion to nutrients by computer), and interpretation of dietary intakes. Case studies follow, involving specific diet/disease relationships integrating information from international studies, secular trends, clinical trials, analytical epidemiology, and animal experiments.

Prereq. BIO 200ab or BIO 201ab, EPI 200a or EPI 201a, and permission of the instructor for students who have not taken a course in nutrition.

NUT 300abcde. Tutorial Programs

Time and credit to be arranged.

Individual work under direction may be arranged. This can include laboratory studies, projects in applied nutrition, library research, or the following special topic.

301 Nutrition and Health Promotion in the Mass Media

Dr. Goldman, Dr. Cheung.

The role of the mass media in the promotion and adoption of healthy eating practices; extent and quality of coverage in various mass media outlets; creating messages for mass media use; effectiveness of existing mass communication campaigns in nutrition.

Prereq. NUT 201a/201b or equivalent; background in behavioral sciences or education.

NUT 352-370. Research

Time and credit to be arranged.

Facilities are available for doctoral students to do advanced work in nutrition along the lines of fundamental or applied research as related to public health and medicine. Areas currently receiving intensive and comprehensive study in the department are as follows:

352 Dr. Goldman.

The metabolism of food constituents and drugs, particularly as carried out by intestinal bacteria. Emphasis given to areas of metabolism that may help to understand a compound's biological activity.

353 Dr. Lown.

Coronary artery disease; etiology of sudden death; derangements of the heart beat; exercise physiology; electrolyte metabolism.

356 Dr. Antoniadou.

Regulation of cell growth by hormonal growth factors derived from human serum or platelets; platelet-derived growth factor and atherogenesis; mechanisms of hormone transport and regulation.

358 Dr. Herrera-Acena.

The role of nutrition and other environmental factors in the etiology and management of diabetes mellitus; the relationship of malnutrition to physical and cognitive development.

363 Mrs. Witschi.

Computer-based interactive dietary history, analysis, and counseling programs.

364 Dr. Reinhold.

Structural characterization of glycoconjugates on biosurfaces by high performance liquid chromatography, gas chromatography, and mass spectrometry.

366 Dr. Franceschi.

Regulation of cancer cell growth and differentiation by nutritional factors with emphasis on calcium and vitamin D, control of calcium transport, and gene expression by 1,25-dihydroxyvitamin D³.

368 Dr. Owen.

Hormonal regulation of nutrient uptake and membrane function in human cells. Mechanism of action of growth factors. Regulation of amino acid transport and protein synthesis.

369 Dr. Sul.

Regulation of lipogenic and glycolytic enzymes by hormonal and nutritional factors and alteration of this regulation in the diabetic state.

370 Dr. Storch.

Regulation of lipid transport and membrane composition.

Admission limited and subject to approval of the instructor.

■ POPULATION SCIENCES**POP 191ab. Human Settlements (Sociology 191)**

Lectures. *Two 1-hour sessions each week. 5 units.* Dr. Alonso.

Stresses the interaction of societies and their geographies, focusing primarily on historic and current developments in the United States. Considers demography, technology, institutions, ideology, health, the economy, and other factors.

POP 200ab. Introduction to Population Sciences

Lectures. *One 2-hour session each week. 2.5 units.* Dr. Potter, Dr. Mertens.

Reviews the basic elements of population change—fertility, mortality, and migration—and their interaction with social, cultural, and economic characteristics of societies for both developed and developing countries. Introduces basic demographic concepts and methods, including demographic rates and the life table.

POP 201ab. Community Foundations of Population Dynamics

Not given 1988–89.

Seminars. *One 2-hour session each week. 2.5 units.* Members of the Department.

Supplements the introduction to population sciences presented in POP 200ab. Through in-depth study of several defined human communities, students learn how to trace immediate and underlying causes of rates of birth, death, and migration with inferences for the goals of public health and population policies and programs. Short papers are required.

POP 202cd. Student Project Design Seminar

Seminars. *One 2-hour session each week. 5 units.* Dr. Levins.

Oriented toward health and population problems of communities. Each student selects a community and an appropriate health or population problem. He/she presents a critical survey of the relevant literature and a project design, to amplify understanding of the relative frequency of the selected problem in relation to other health or population problems of the community, and to increase or test the available knowledge of causes of the problem. Prereq. POP 217b; introductory courses in biostatistics and epidemiology. Enrollment after interview with the instructor.

POP 204cd. Biological Basis for Fertility Control

Lectures. *Three 1-hour sessions each week. 5 units.* Dr. Salhanick, Dr. Seeley. Presents the fundamental physiology and biochemistry of known and potential methods of family planning. Topics include the biosynthesis, secretion, and actions of the gonadal, gonadotropic, and hypothalamic hormones, the relationship of the natural steroid hormones to synthetic analogues, and regulation of the menstrual cycle. A short paper or presentation may be required.

Prereq. Appropriate science background or permission of the instructor.

POP 205ab. Introduction to Demographic Analysis

Lectures, discussions. *Two 2-hour sessions each week. 5 units.* Dr. Potter.

Reviews fundamentals of the measurement and analysis of mortality, nuptiality, fertility, population growth, and age structure. Topics include sources of demographic data, demographic rates, cohorts and periods, model life tables and models of nuptiality and fertility, stable population theory, and population projections. Students will have the opportunity to analyze the demographic future of selected countries such as the United States, Mexico, and China.

POP 206cd. Demographic Methods for Developing Countries

Seminars. *Two 2-hour sessions each week. 5 units.* Dr. Potter.

Introduces the wealth of demographic surveys and censuses available for developing countries, and reviews procedures for analyzing these data, including indirect techniques for use with limited or faulty data. After covering the basic methods for the estimation of infant, child, and adult mortality, and age-specific fertility rates, attention is given to a selected number of current topics such as the influence of birthspacing on child survival, the demographic impact of treatment for vitamin A deficiency, and mortality from AIDS in Africa. Class exercises will involve using SAS to process a recent survey. Prereq. An introductory course in population.

POP 207ab. Social Science Approaches to Population Change

Lectures. *Two 2-hour sessions each week. 5 units.* Dr. Potter, Dr. Mertens.

Reviews major contributions and debates in the social sciences with respect to theories of population change and causes of fertility, mortality, and migration. Focuses both on historical European experience and on societies in the contemporary developing world.

Short papers are required.

POP 209ab. Foundations of Agricultural Sciences (Biology 195)

Not given 1988-89.

Lectures, seminars. *Two 1½-hour sessions each week. 5 units.* Dr. Levins.

Examines patterns of world food production as they develop from the interaction of social and biological systems: evolution of agro-ecosystems, principles of plant growth and productivity, pests and diseases, ecology of farming systems, consequences of technical choices, issues of agricultural change, and research strategies.

Prereq. Course in biology or permission of the instructor.

POP 210cd. Ethical Components of Health Care Decision Making

Lectures, discussions. *One 2-hour meeting each week. 2.5 units.* Dr. Dyck.

Introduces students to major modes of moral reasoning as these are found in ethics and in health care policies. Topics include ethical theory, the use of humans in research, medical screening, population policy, adolescent pregnancy, surrogate motherhood, and the allocation of scarce medical resources. Reading are taken from philosophical, medical, and legal scholarship, as well as official documents of governmental and non-governmental agencies.

POP 212cd. Economics of Population Growth (Economics 2730)

Lectures. *Two 1-hour sessions each week.* Laboratory. *One 1½-hour session each week. 5 units.* Dr. Leibenstein, Dr. Potter. Emphasizes effects of population growth on problems of underdeveloped countries. Examines the welfare economics of population control, relations between population growth and resources, age-structure effects on demographic and economic variables, economic determinants of fertility change, and the population obstacle to economic growth.

Prereq. POP 200ab and HPM 205ab or equivalent.

Note: This course is given in Cambridge.

POP 214cd. The Biological Determinants of Fecundity, Environmental Factors, and Population Growth

Lectures. *One 2-hour session each week. 2.5 units.* Dr. Frisch.

Emphasizes the direct effect of environmental factors such as nutrition and physical activity on female and male reproductive ability throughout the reproductive span. Topics include adolescent growth, age of menarche, effects of exercise on the menstrual cycle, male maturation, age-specific fertility, pregnancy wastage, lactational amenorrhea and the birth interval, and age of menopause. Also included are the basic physiology and endocrinology of human reproduction, the history of birth control, and the interaction of biological factors and social customs affecting population growth.

Prereq. Course in biology or permission of the instructor.

POP 216cd. Comparative Analysis of Public Policies in Developing Countries (KSG S-552, Government 2110)

Lectures, seminars, workshops. *One 2-hour session each week. 5 units.* Dr. Montgomery (John F. Kennedy School of Government).

Examines patterns of policy making across cultures and issue areas, including interactions between policies and social contexts. Surveys Third World policies for dealing with such problems as population (fertility and migration), malnutrition, land reform, and management of large-scale irrigation systems. Applies the policy sciences approach to the formulation and implementation of large-scale programs of public intervention in social processes.

POP 217b. Introduction to Community Diagnosis of Birth and Death Rates in Developing Countries

Lectures, discussions. *Two 2-hour sessions each week. 2.5 units.* Dr. Berggren.

Helps students distinguish within communities those kinds of persons at high risk of serious illness, death, and unwanted births. Uses data from studies at national and local levels to trace underlying causes of these events as the basis for designing feasible, effective, and simple preventive measures. Provides foundation for POP 202cd and for other health and population courses considering policies and programs. Provides instruction and practice in the design and methods of field data collection and analysis at an introductory level.

Prereq. Introductory courses in biostatistics, epidemiology, and (preferably) population sciences.

POP 218c. Essentials of Human Reproduction and Family Planning

Lectures. *One 2-hour session each week. 1.5 units.* Dr. Berggren.

Reviews key facets of human reproduction. Designed for non-physicians. Considers basic and applied aspects of human embryology, anatomy of the reproductive

system, physiology, and endocrinology. Lectures and exercises supplemented by required reading. Special attention is directed to sexual behavior as it relates to reproduction and contraception. Field methods to assess reproductive functions are reviewed. Experience in developing countries emphasized. A review of sexually transmitted diseases and the role of family planning clinics and sex education in their control will also be covered.

POP 220d. Human Ecology

Lectures, seminars. *Two 2-hour sessions each week. 2.5 units.* Dr. Levins.

Provides a broad overview of the human ecosystem as it emerges out of, but is different from, pre-human ecology. Topics are selected from biosphere processes, population interaction, agricultural systems, adaptation, ecological politics, and evolution. Also considers the role of knowledge and conscious planning as an aspect of human ecology and examines approaches toward the solution of ecological problems. Prereq. Assumes basic knowledge of biology.

POP-HPM 263c. Case Studies in Design and Management of Population and Community Health Programs

Case discussions, seminars. *Two 2-hour sessions each week. 2.5 units.* Dr. Berggren, Dr. Strachan.

A managerial perspective on the problems of developing and implementing population and primary health care programs in Third World nations. Problems are examined from the level of managers of clinics, community and national programs. Topics covered primarily through case studies based on family planning and primary health care programs, particularly at the community and regional levels.

POP 300abcd. Tutorial Programs

Time and credit to be arranged.

Students at the master's level may make arrangements for tutorial work and special reading on topics related to population problems. There may be an opportunity to consider the design of studies, programs, or analysis of data.

POP 330e/330f. Field Studies

Field Trip to Haiti or the Dominican Republic. Dr. Berggren.

The objective of this field study is to provide exposure to the urban, rural, and development problems of a developing country. Students visit the homes of rural farmers to observe the living conditions of these families and their accessibility to health care facilities and programs. Students also see rural health centers, health surveillance teams, nutrition programs, and the headquarters of various health programs. What has been observed, how it relates to data previously collected, and what programs can be developed to improve the conditions are then discussed with the group's leaders and with local health planners. Students are required to

give a talk to Haitian or Dominican colleagues and to write a report at the end of the trip.

The field trip is held during the week between the fall and spring terms or the week between the two halves of the spring term; the week chosen will be at the discretion of the tour directors. Students must sign up for the course with the department by October 14. Partial financing of the course is the responsibility of the student and should be arranged as early as possible in the academic year. Enrollment limited to 10 and subject to approval of the instructor.

POP 350-356. Research

Time and credit to be arranged.

Candidates for doctoral degrees may undertake research in the department or may integrate research in population sciences with a doctoral program in another department or at the Center for Population Studies.

Members of the department and of the Center for Population Studies are currently engaged in research in the following areas:

- 350 *Population and Development*
Dr. Stark.
- 351 *Biomedicine and Reproductive Physiology*
Dr. Salhanick.
- 352 *Demography*
Dr. Potter.
- 353 *Population Ethics*
Dr. Dyck.
- 354 *Biological Determinants of Fertility*
Dr. Frisch.
- 355 *Complex Systems*
Dr. Levins.
- 356 *Migration and Development*
Dr. Stark.

The following course, offered by another faculty of Harvard University, is among those that may be of particular interest to students of population sciences. It is open to qualified students from the School of Public Health.

Ethics 2859. Seminar: Ethics in Medicine and Public Health

Half course (*spring term*). *Hours to be arranged.* Dyck.

Previous work in ethics, law, or medicine required.

■ TOXICOLOGY

TOX 204a. Introduction to Principles of Toxicology

Lectures, seminars. *Two 2-hour sessions each week. 2.5 units.* Credit will be given only upon successful completion of this course and ESP 233b. Dr. Rice, Members of the Laboratory.

This course is a prerequisite for ESP 233b, *Industrial Toxicology*, and may not be taken in isolation. The course content is identical to the first half of TOX 205ab, *Principles of Toxicology*.

Prereq. Organic chemistry and mammalian physiology.

TOX 205ab. Principles of Toxicology (HMS Pharm. 713, FAS Pharm. 218)

Lectures, seminars. *Two 2-hour sessions each week. 5 units.* Dr. Rice, Members of the Laboratory.

Emphasizes mechanisms of injury resulting from exposure to environmental chemicals at the molecular, cellular, organ, and organismal levels. Methods used to detect, evaluate, analyze, and alleviate the toxic effects of chemicals are discussed.

Prereq. Organic chemistry and mammalian physiology.

TOX 208ab/209cd. Seminar in Toxicology

Seminars. *One 1-hour session each week. 1 unit each term.* Dr. Samson, Members of the Laboratory.

Includes seminars, journal clubs, and discussions of topics in basic research and the current literature in toxicology.

Prereq. Background in toxicology or related fields and permission of the instructor.

TOX 210ab/211cd. Advanced Toxicology

Laboratory with discussions, seminars, and assigned readings as appropriate. *To be arranged. 5 units.* Dr. Tashjian, Members of the Laboratory.

Examines experimental methods of research in toxicology. Includes individual laboratory work.

Prereq. TOX 205ab or equivalent and permission of the instructor.

TOX 300abcd. Tutorial Programs

Time and credit to be arranged.

Dr. Tashjian, Members of the Laboratory. Opportunities are provided for tutorial work in molecular, cellular, biochemical, and environmental toxicology.

Prereq. Permission of the instructor.

TOX 350. Research

Doctoral candidates may undertake laboratory research in toxicology under the direction of a faculty member.

Dr. Tashjian, Dr. Eisenstadt, Dr. Ofner, Dr. Rice, Dr. Samson, Dr. Schlegel, Dr. Toscano.



Assistant Professor of Toxicology
Leona Samson looks at damage to
chromosomes in human cells.

■ TROPICAL PUBLIC HEALTH

TPH 201a. Ecology, Epidemiology, and Control of Important Parasitic Diseases of Developing Areas

Lectures, seminars, demonstrations. *Two 1-hour sessions and one 2-hour session each week. 3 units.* Dr. David, Dr. Maguire, Members of the Department, Guest Lecturers.

Provides an introduction to ecological and epidemiologic concepts basic to the control of infectious agents. Considers important parasitic diseases of particular significance in the developing areas of the world. Epidemiologic principles of vector-associated diseases are elucidated through study of entities such as malaria and schistosomiasis. Prior knowledge of the pathogenesis of disease produced by infectious agents is desirable.

TPH 202b. Epidemiology of Infectious Diseases of Public Health Importance in Developing Countries

Lectures, team meetings. *Two 2-hour sessions each week. 2.5 units.* Dr. Cash, Guest Lecturers.

The epidemiology of infectious diseases of public health importance in developing countries is thoroughly reviewed. Emphasis is placed on epidemiologic patterns of bacterial and viral diseases as they relate to different geographic and socioeconomic environments. Methods of disease surveillance, especially with regard to prevention and control, are also stressed. Case studies are extensively used with student teams proposing solutions to the problems. Enrollment limited to 40 and subject to approval of the instructor if students have no previous background in health care delivery.

TPH 203b. Mycobacterioses

Lectures. *One 2-hour session each week. 1.25 units.* Dr. Piessens, Dr. Koch-Weser, Guest Lecturers.

Covers the immunobiology of mycobacteria and worldwide epidemiology, clinical diagnosis, and treatment of tuberculosis, leprosy, and diseases caused by other mycobacteria. Also deals with laboratory diagnosis, BCG vaccination, chemoprophylaxis, prevention, and tuberculosis control in Massachusetts, the US, and other countries.

TPH 204c. Introduction to the Techniques of Investigation of Parasitic Infections

Lectures, seminars. *Two 3-hour sessions each week.*

Laboratory. *One 2-hour session each week. 5 units.* Dr. Pan.

Emphasizes basic laboratory methods for the study of parasitic diseases of public health importance. Provides exposure to theory and application of techniques essential to epidemiologic and laboratory investigation. Life cycles of several parasites maintained and examined with respect to detection and quantification of infection, immunity, and control.

Enrollment limited to 15 and subject to approval of the instructor. Preference given to concentrators in tropical public health and cancer biology.

TPH 205c. Clinical and Pathologic Features of Tropical Diseases

Case presentations, clinico-pathologic conferences, demonstrations. *One 2-hour session each week. 1 unit.* Dr. Maguire, Dr. Dammin, Dr. Franz von Lichtenberg (Harvard Medical School), Members of the Department, Members of the Pathology Department.

Designed for students particularly interested in tropical medicine. Emphasis is on the clinico-pathologic aspects of tropical diseases. At each session, disease entities are introduced by presenting a clinical case, and pertinent clinical and pathologic features of the disease are then reviewed. Enrollment subject to approval of the instructors.

TPH 206d. Principles of Public Health Entomology

Lectures, laboratories, seminars, field trips. *One 3-hour session each week. 2.5 units.* Dr. Spielman, Dr. Ribeiro.

The manner in which arthropods transmit disease and the principles of vector control are discussed from ecological, physiological, and genetic points of view. Class sessions introduce concepts and techniques currently employed in controlling vector-borne disease. Weekend field trips provide an opportunity for students to apply skills acquired in the classroom.

Prereq. TPH 201a or suitable biology background and permission of the instructors.

TPH 207c. Principles of Vector Physiology

Lectures, discussions. *One 1-hour session and one 2-hour session each week. 1.25 units.* Dr. Ribeiro.

Presents the physiology of blood-sucking arthropods in a series of lectures and discussions. This course aims to provide the student with an interest in arthropod-borne diseases and a base of insect physiology that will enable a comprehensive view of the interaction between pathogen/vector at a biochemical/physiological level. Each session requires reading up to five papers in the literature and writing answers to problem sets.

Prereq. Background in biology and biochemistry and permission of the instructor.

TPH 208d. Current Problems in Schistosomiasis

Lectures and seminars. *One 2-hour session each week. 2 units.* Dr. Chernin, Members of the Department.

The problems posed by schistosomiasis as an expanding health hazard are presented in a series of lectures and seminars. Emphasis is given to the biology of snail vectors, to problems of assessment of significance of the disease, and to the potentials of various approaches to control.

Prereq. TPH 201a or permission of the instructor.

TPH 210c. Current Problems in Malariology

Lectures, seminars. *One 2-hour session each week. 2 units.* Dr. Jungery, Dr. Spielman, Members of the Department.

Reviews the biology of the malaria parasite, emphasizing factors that particularly affect transmission and human morbidity and mortality. Introduces the principles of malariometry and the strategies for controlling malaria. Analyzes current control programs in seminar discussions.

Prereq. TPH 201a and permission of the instructors.

TPH 216cd. The Biology of Parasitism (HMS Imm. 721.0, FAS Imm. 214)

Lectures, discussions. *One 3-hour session each week. 2.5 units.* Dr. Harn, Dr. Titus, Members of the Department, Guest Lecturers.

Covers aspects of the biology, immunology, and molecular biology of various protozoa and helminths. Includes discussion on the mechanism of immune evasion, mechanism of antigenic variation, and the biology and immunology of malaria, schistosomes, filariae, leishmania, amoeba, and trypanosomes. Each session requires reading three or four papers in the literature and writing answers to problem sets.

Prereq. Suitable course in basic immunology and biology and permission of the instructors.

TPH 220b. Basic Concepts in Immunology

Lectures, discussions. *One 2-hour session each week. 1.25 units.* Dr. Harn, Dr. Piessens.

Presents basic concepts in immunology. Covers most of the defined humoral and cellular components of the immune system. This information is taken from readings and discussion of selected papers in the literature which present key findings on how the various components of the immune system function.

Prereq. Permission of the instructors.

EPI-TPH 224d. Field Methods for Developing Countries: Epidemiology, Surveys, Program Evaluation

Two 2-hour sessions each week. 2.5 units. Members of the Department, Guest Lecturers.

(Course described under Epidemiology.)

TPH 300abcde. Tutorial Programs

Laboratory exercises. *Time and credit to be arranged.*

Individual work for candidates at the master's degree level may be carried out under supervision of a member of the department. Various parasites of medical importance are maintained and are available for studies on immunology, molecular biology, cell biology, biochemistry, and chemotherapy. Arrangements subject to approval of the instructor.

TPH 350. Research

Doctoral candidates or qualified full-time special students may undertake original investigations in the laboratory or in the field by arrangement with the chairman of the department.

Members of the department are currently engaged in the following areas of research:

Biology, host-parasite relationships, and control of protozoa and helminths

Population genetics, nutrition, and reproduction of medically important arthropods

Immunology of protozoa and helminths

Molecular biology of protozoa and helminths

Arthropod transmission of viral, protozoan, and helminthic agents

Cultivation in vitro of parasitic helminths and protozoa of medical importance

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Harvey V. Fineberg, Dean of the Faculty of the School of Public Health, left, and Elkan R. Blout, Dean for Academic Affairs.

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Alan Agresti, BA (University of Rochester); MS, PhD (University of Wisconsin), Visiting Professor of Biostatistics; *Professor of Statistics, University of Florida*.

William Alonso, AB, MCP (Harvard University); PhD (University of Pennsylvania), Richard Saltonstall Professor of Population Policy (*Population Sciences*).

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J. Larry Brown, AB (Anderson College); AM (University of California, Los Angeles); MSW, PhD (Brandeis University), Lecturer on Health Services (*Health Policy and Management*) and Director of the Community Health Improvement Program.

William Alfred Burgess, SB (Tufts University); SM (Harvard University), Associate Professor of Occupational Health Engineering (*Environmental Science and Physiology*); *Corporate Manager of Industrial Hygiene, Polaroid Corporation*.

James Preston Butler, AB (Pomona College); AM, PhD (Harvard University), Associate Professor of Biomathematics (*Environmental Science and Physiology*).

John Cairns, MD, BA, BM, BCh, DM (Oxford University); AM (hon.) (Harvard University), Professor of Microbiology (*Cancer Biology*).

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Warren Ernest Clyde Wacker, MD (George Washington University); AM (hon.) (Harvard University), Member of the Faculty of Public Health and Henry K. Oliver Professor of Hygiene; *Director of University Health Services.*

Alexander Muir Walker, AB, MPH, MD, DrPH (Harvard University), Associate Professor of Epidemiology.

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Paul Maximillian Densen, AB, SD, AM (hon.), Professor of Community Health, Emeritus (1980).

Melvin William First, SB, SM, SD, Professor of Environmental Health Engineering, Emeritus (1985).

Robert Pershing Geyer, SB, SM, PhD, Professor of Nutrition, Emeritus (1987).

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Below is a list of Harvard School of Public Health alumni who have indicated their willingness to answer questions potential applicants may have about the school. They can respond to queries about departments, curricular matters, possible career opportunities, and alumni activities. These individuals can also refer you to other alumni whose academic and/or career interests more closely match your own and may be able to direct you to a graduate living in your immediate area. You may also write the school's Alumni Office, Room 1011, Kresge Building, 677 Huntington Avenue, Boston, MA 02115.

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